The Builder.

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The Remains of Ancient Rome.

A LITTLE more than six years ago we had the pleasure of noticing at some length* Professor Middleton's single volume on "Ancient Rome in 1885," a book which, though a small one for so great a subject, had the special value that it combined the observation of the practical architect with that of the archæologist, and brought to notice many points in regard to the construction of ancient Roman buildings which had been overlooked, and probably not understood, by the many archæological writers who have described and illustrated the topography of Rome. In the meantime Professor Middleton has not been idle, and he now produces what is to a great extent a new book,† though founded on the former one. The two volumes of "The Remains of Ancient Rome" contain most of the matter which was to be found in "Ancient Rome in 1885," but rearranged and largely added to both in regard to literary matter and illustrations.

Professor Middleton's book is one to be recommended to those who take their Rome seriously. It is not a handbook for the general sightseer, who would no doubt be much the better for studying and endeavouring to understand it, but is hardly likely to do so; he will find the practical descriptions uninteresting to him and the diagrams of construction unintelligible, and will probably return contentedly to his "Murray" for food more convenient for him. But to those who wish for real knowledge about the ancient buildings of Rome, and especially to architectural students, this is a most valuable book, the more so in containing so much information in such small and convenient volumes. Professor Middleton appears to possess an unusual faculty of noting little things in ancient remains, indications which are slight in themselves, but which furnish the data for very important conclusions as to the structure and structural history of a building. He seems in many cases to have looked into the actual indications of construction in a manner which has hardly been done before, and though he has not given us sumptuous drawings of the remains of ancient Rome, he gives us a number of diagrams of facts of construction, from observation at first hand, which are of permanent value.

In the present form of the book we commence with a chapter on the general question of the site of Rome, followed by one giving a general description of Roman methods of construction. In the Introduction we have also a useful list of existing books on the topography and antiquities of Rome, and of the most important existing inscriptions, coin collections, and other sources of information ancient and modern. In the sketch of the history of the site of Rome we are reminded of some of the early history of London; "the Forum Romanum, the velabrum, the great Campus Martius (now the most crowded part of modern Rome), and other valleys, were once almost impassable marshes and pools of water." There seems to be a tendency in the history of great cities to this crowding important quarters on to low marshy sites. London has her Westminster and Lambeth, and Paris her "Marais." The history of the contour of the site of Rome, in the author's rapid generalisation, is the history of a progress from accentuating the natural inequalities of level to reducing them as far as possible: a common history in the progress from an uncivilised to a highly civilised stage. At an early period, as Professor Middleton observes, when each hill was crowned by a separate village fort, it was an object of the rival inhabitants "to increase the natural steepness of the cliffs, and so render access more difficult and defence easier." As the various parts of the site became united under one Government, the object naturally became to get rid of the disjoining effects of this variation of contour, and in Imperial times especially great works were carried out in order to get rid to some extent of the inconvenience of hills and vallies. The same history is repeated constantly in large cities on uneven sites, as we see in the case of Holborn Viaduct; Union-street, Aberdeen; and the bridges which connect the Old and New Towns of Edinburgh. The two Scottish towns, however, have not obliterated the naturally picturesque character of their sites, and the passenger along Holborn Viaduct has still the evidence before him that there was once a Holborn valley. But under modern municipal regulations Rome is being, as far as possible, reduced to a condition of entire oblivion of her old title as the city of seven hills; the effort being not so much to connect the high levels by bridges and viaducts as to gradually obliterate the differences of level altogether and bring the town to the condition of an elevated plain half way between its ancient higher and lower levels. Along with this effort goes the constant formation of new and uninteresting modern streets intruding upon and shouldering out the reverend vestiges of the ancient city. In our review of the former book in 1886, we referred with gratification to the map of modern Rome appended to it, as showing that the contemplated improvements and extensions, the new quarters, seemed at all events to be kept pretty well out of the range of the most valuable portions of the ancient city. But alas! since then the march of enlightenment has gone on with giant strides. In his former preface the author could refer, without any expression of dissatisfaction, to the important discoveries of early tombs and houses "brought to light by the extensive excavations made in laying out a new quarter of modern Rome." But now it seems to be not so much a question of laying out new quarters as of laying out ancient Rome over again. It is melancholy to read in the preface to the new book of what Professor Middleton has noted since the publication of the earlier volume; the Ludovisi gardens built over with "villas," the demolition of the picturesque old houses on the Tiber banks to make way for a stone embankment. "No words," he says, "can adequately express the disgust which must be experienced both by the antiquary and by the lover of beauty in any form who now visits

* *Builder*, January 2, 1886.

† "The Remains of Ancient Rome." By J. Henry Middleton, Slade Professor of Fine Art, Director of the Fitzwilliam Museum, and Fellow of King's College, Cambridge. London & Edinburgh: Adam & Charles Black; 1892.

this unhappy city. The injury done in former periods of destruction was but superficial compared to the ruin which is being wrought by the present scheme of *piano regolatore*, which aims at and is partly succeeding in levelling the seven hills and filling up the intermediate valleys; changing the very face of nature, and utterly destroying the character of the former capital of the world." The author is reasonable enough, however, to remember that since Rome has become the capital of Italy, it would be hardly fair to blame the admininistration of a modern city for doing what every other modern municipality is doing, improving roadways and approaches. It is the case of Venice over again. As we observed some time since, in connexion with the much-dreaded Venice "improvements," we can hardly demand that the modern Venetians, who have their own way to make in the world, should keep ancient Venice as a picturesque sight for the rest of the world, if it is not to their own interest or convenience to do so. To modern Romans, as to modern Venetians, the ancient buildings, seen by them every day, have apparently none of the poetic interest which they have in the eyes of the visitor; they are only obstacles in the way of modern improvement. The great monuments of Rome are indeed of such exceptional and world-wide importance and interest that they have so far escaped any threat of demolition, though we should not be surprised to find that there were those among the modern Italians who would be willing, if public opinion permitted it, to clear the Colosseum and Forum sites and lay them out for new building-lots. The great monument of all, however, is Rome itself, the most wondrous and enthralling remnant of the central life of the antique world, which is now in process of being gradually wiped out. The poetry, the glamour, of this great relic of a great past will ere long be only recognisable in the verse of Byron, and the next generation will be left to wonder what it was which inspired his nobly-expressed enthusiasm. It is a melancholy consideration that all these links with the past are being little by little stamped out and effaced; but apparently the only remedy for it, before long, will be for Europe to buy up some of the great sites of ancient splendour and preserve them as a possession for the educated world. Whether that is a possible alternative we do not venture to suggest; but it appears likely that it will prove the only one.

To return to Professor Middleton's book: in his second chapter, on Roman methods of construction and decoration, he warns the reader that no subject has been treated in so misleading a manner, partly because it has been largely treated by archæologists who had no practical knowledge of building, partly because "the real methods of construction in ancient Rome are frequently hidden behind very deceptive modes of surface decoration." The author notes that the purpose of mortar, which was only introduced at a late period in Roman building, was apparently not to bind the blocks together but merely to give the joints and beds smooth-fitting surfaces. In still later times, towards the close of the Republic and under the Empire, even this thin bed of mortar disappears, and the stones are apparently fitted as in the Greek columns, by rubbing them on one another. He mentions a remarkable example in the recently-exposed angle of the temple of Faustina, where the masonry has been well preserved at the lower part under accumulations of earth, and where he remarks that the beds and joints are so close as to be imperceptible except with the closest examination. This is the perfection of masonry building, but a perfection not to be obtained, of course, under a contract system of building against time. The Romans were bad artists (as Professor Middleton fully admits), but there is something worthy of the highest respect in this kind of perfection of building work; on which we might learn a lesson from them, if we could first unlearn our own modern lesson of building as quickly as possible rather than as well as possible.*

The most singular feature in Roman construction is perhaps the constant employment of superficial brick arches, surface arches, too shallow to be of any use constructively, and not intended for appearance, as they were used on walls intended to be stuccoed. The so-called relieving arches in the wall of the Pantheon are of this class, the wall being solid concrete behind them. Professor Middleton offers no explanation of this curious custom, though he comments on it in several places; nor does it seem possible to give any reasonable explanation. It seems as if it were a survival from some earlier manner of building; it is certainly oddly at variance with the otherwise practical character of Roman building, that they should have persistently used a piece of sham construction of this kind for which no practical object can be assigned. But the author arraigns the whole apparent brick construction of the Romans as a mere sham, a face to concrete walls, but a face which was to be covered up again either with stucco or (in special cases) with marble veneer. He gives a sketch showing the exterior facing and the section of a wall of this kind, the entire mass composed of concrete except a facing of thin bricks, triangular on plan, with the points inwards. As the author observes, this brick facing could not possibly be meant as a matrix for the concrete, for it obviously would not have withstood the pressure of the latter while in a wet state. It must have been necessary to support this and the concrete with an external timber framing in the same way as for unfaced concrete; and the author evidently set himself to look for the signs of such timber framing, which ordinarily would not show on the brick-work, and thinks he has found it in the remains of the Golden House of Nero, under the Thermæ of Titus, where he says "the channels formed by the upright posts are clearly visible. These upright grooves on the face of the wall are about 6 in. wide by 4 in. deep, and they were afterwards filled up by the insertion of little rectangular bricks so as to make a smooth unbroken surface for the plastering." We cannot suggest any other meaning for the upright grooves as described, but the explanation seems rather problematical. If the object were to support the brick skin along with the concrete, why place the supports within the line of wall-surface? They would have been more effective for their purpose outside of it, and left no spaces to fill in afterwards. In regard to the concrete itself, Professor Middleton notes that the larger pieces of the aggregate in the concrete, which are not close together, are so evenly spaced apart as to lead to the conclusion that they must have been put in by hand, piece by piece; a hint perhaps for our concrete builders. But that again would not do for building carried out against time and at prices cut down to the lowest margin by competition.

Of the boldness of the Romans in using their splendidly-made concrete for roofs and vaults Professor Middleton points out some significant examples besides the now well-known one of the Pantheon; we say "now" well-known, because it has been described and even drawn by various writers as essentially a brick dome, being in fact a vast inverted cup of concrete standing in its place like a single solid mass. Professor Middleton mentions a striking instance in the Thermæ of Caracalla, at a point where a brick-faced concrete wall originally rested on a marble entablature supported by two granite columns. "In the sixteenth century the columns and the marble architrave above them were removed for use in other buildings,† and yet the wall above remains, hanging like a curtain from the concrete vault overhead." The vaulting and dome system of the Romans, indeed, may be said to have been the use of the arch form with the statics of the beam, the cohesion of the material supplying the place of the buttress in preventing the spreading of the walls, the vault having practically no thrust at all. Brunel practically adopted this system on one occasion, when a railway bridge fell just after building; instead of altering the design of the bridge, he simply rebuilt it in cement. The Roman method cannot be called unscientific as the Romans used it, for the science, instead of going into the constructive problem, went into the composition and making of the concrete; thought was saved in construction by thought bestowed on material. There must, as the author observes, have been very elaborate construction of centreing for these great thick concrete vaults. He gives, as an ascertained fact, a common late method of avoiding the necessity of building the centreing from the ground, by setting the springing of the arch back from the face of the pier, so as to leave a ledge from which the centreing was built, the line of the pier being afterwards carried up till it met the intrados of the arch, thus filling the lower part of the arch and leaving it the segmental one. This is a very ingenious surmise on existing evidence, very likely to be correct, but ought it, with the diagram of the centreing, to be given as an ascertained fact?

The third chapter of the book deals with the half-legendary subject of the prehistoric period, which has left only the remains of the wall of Roma Quadrata as hard fact, and the regal period, in regard to which the author brings together the record of all remains, known or imputed, of this period. Further chapters in the first volume deal with the Palatine Hill (to which two chapters are devoted), the Forum Romanum, also occupying two chapters, the Capitoline Hill, and a chapter on "The Architectural Growth of Rome." The description of the remains on the Palatine is very full and detailed and of great interest. In speaking of the Flavian palace Professor Middleton remarks in regard to the porphyry statues with which the state-room is known to have been decorated, that the Romans probably acquired from Egypt both the taste for statues in this hard material and the tools with which to work it; and in a note on another page he observes that the circular markings on the side of drilled holes in this material "show by the rapidity of their spirals that the drills must have sunk into the hard granite with wonderful speed;" a passage which we quote as showing the minuteness of observation which the author has brought to bear on his subject. In speaking of the rostra in the Forum also, he has not failed to notice the positions of the holes drilled, and the remains of metal pegs, for securing the rostra (beaks of ships) which gave the name to the erection, and by which it is possible to fix their position and number, as shown on a restored elevation of the front of the platform. A restored plan of the Forum, printed in colours to show the different materials and the distinction between restored and existing work, is given in a pocket in the cover of the volume, and forms one of the most valuable items in the book; it should be studied by all who intend to visit this famous site. A similar coloured plan was given with the author's former book, but has been revised and brought up to date for the present publication.

The second volume treats of the Imperial Fora of Rome, the Circi, Theatres, Baths, Tombs and Honorary Monuments, and two chapters are devoted to the water-supply of Rome, and the Roads and Bridges. These latter are not the least interesting portions of the book. The author reckons the amount of water brought into Rome by the aqueducts as probably 340 million gallons per day. Of course the extensive and constant use of baths necessitated a quantity far in excess of what would be considered liberal for a city of the same size in the present day; but though we

* We are not, however, the worst sinners in this respect among modern nations. To judge from accounts which we have printed not long since of American methods of bricklaying, it should seem that the United States is quite ahead of us in the art of rushing through walling in the quickest way in which a tolerable show can be made on the surface, bond or no bond.

† What is the evidence of this, and of the date of removal? It is not given.

shall not see the Roman passion for bathing revived in our day and in this climate, it is well to remember, in connexion with the question of water-supply, that the increasing use of bath-water by all classes is a now constantly-increasing factor in the estimate to be made for the water-supply of a modern English city.

We have been able but to indicate a few of the items of interest in this book, which for its size is one of the most complete treatises of the kind ever produced, and is full of information on every page, and can hardly be said to contain a superfluous line. The author deserves the best thanks of all who are interested in the history and monuments of this greatest and most important of ancient cities within our knowledge, for the conscientious care and acute observation with which he has treated the subject, and which render his book unquestionably the standard English work on ancient Rome.

DISCOVERIES IN THE ATHENIAN AGORA.

WE drew attention in a recent number to the discovery by the German Archæological Institute, in their excavations during the winter, of traces of the Panathenaic-road and of the aqueduct of Peisistratos, both of the first importance for deciding certain moot points in the topography of Athens, points left hopelessly uncertain by the account of Pausanias. Since then a fuller report of these excavations has been issued in the last number of the Athenian *Mittheilungen*, a summary of which may be of use to our readers.

The German Institute began its work at the end of January, with the avowed intention of throwing light on the arrangement of the buildings known to exist in the Athenian Agora. The idea was to begin a little to the east of the so-called Theseion, north of the new railway line, just at the place where, according to Pausanias, the Stoa Basileios (Paus. I, iii., 1) must have stood. Obstacles, however, at once arose; negotiations could not for the present be concluded with the owner of that particular piece of ground, so the excavators, though hoping to return to that point later, have had to renounce the natural sequence of their work, and begin to the south, between the Areopagos and the Pnyx. Any one walking along the modern road here can see, to the right as he comes from the "Theseion," traces of an old water-course carried through the Pnyx rock, the purpose of which was obviously to carry water to the ancient market-place. These traces were chosen as the starting point for excavation; the problem was to find the continuation of this aqueduct,—whence the water came, and to what point in the Agora it was directed. As one fountain in the Agora, and one only, was mentioned by Pausanias, — *i.e.*, the Enneakrunos (I, xiv., 1), there is, of course, a large presumption,—nay, almost certainty,—that if the goal of the water-course be discovered, that goal is the Enneakrunos.

The first part of the problem is already solved, and to it we have recently drawn attention, and have only now to add a few particulars. To the left side of the modern road the continuation of the rock channel already visible has been discovered and cleared out. It consists of a watercourse constructed of large limestone blocks, and covered in with the same sort of masonry About its direction there is no doubt. It ran, as Dr. Dörpfeld had predicted, from the Ilissos Valley along the south slope of the Acropolis. It can be connected unquestionably with the rocky channel described in detail by E. Ziller (Athen. *Mittheil.*, II., p. 112), which runs under the palace garden, and which is now used as a water-course. The character of the masonry of the portion of this water-course which has just now been laid bare shows clearly that it was Greek, not Roman work. Its size further makes it certain that in Greek times it was the source of the chief water-supply of the ancient city.

The excavations have now been finished northward, beyond the point where the traces were visible in the rock. So far it is a little disappointing that no evidence of the continuation of the watercourse has come to light. Continuation, of course, there must have been, as the watercourse could not have ended abruptly in the Pnyx rock. The excavators, however, have found what is almost better, *i.e.*, a substantial ancient road, resting on a supporting wall, built of large stones. This led in a gentle curve through the market to the Acropolis. Its inclination is just of the gradual nature required for such a road. Near this road, a little north of it, there was found a structure of Roman or Byzantine date, which proved to be a cistern with a clay pipe. Beneath this a late Greek or Roman building, with a mosaic pavement; close at hand three marble heads, of Roman date, and a statuette of Hekate came to light.

The excavation of the ground between the ancient road and the end of the rock channel is as yet unfinished. From the elevation of the ground at that point, the fountain may quite well have stood there; the hope of finding the Enneakrunos may still be cherished. Even, however, if it has altogether been destroyed, to make room for subsequent structures, or if it lay too far north of west for the present excavations, the discovery of the aqueduct and of the ancient road is a substantial contribution to Athenian topography, and one for which we have to thank Dr. Dörpfeld, who predicted the lie of both lines before the excavation was begun. This may plainly be seen by the plan of the agora issued in a recent work on Athens ("Mythology and Monuments of Ancient Athens," p. 3), based on Dr. Dörpfeld's conjectures. The Panatheniac road followed by Pausanias is here made to pass round the west of the Areopagos, whereas in every previous plan it was made to pass east; the western position is now conclusively proved.

We have elsewhere given from the Athenian *Mittheilungen* some detailed account of the excavations in the Agora at Athens. Since writing this account, we learn from a note in the *Athenæum* of March 26 that the hope there expressed of the discovery of the site of the Enneakrunos has been practically fulfilled. The excavations have been pushed a little further north and west, and Dr. Dörpfeld has come across three terminal stelæ, inscribed, ὅρος λέσχης,—one of them in archaic letters of at latest the early fifth century, the others about the beginning of the fourth. Close at hand is a small building in the form of a ⊓, and in front of it an altar. This must have been a small temple-like building in some relation to the Enneakrunos. That the Enneakrunos really was here is clearly shown by the fact that all about the building are water-conduits leading in various directions, and their masonry shows them to have dated before the Persian wars. The small original building seems to have been superseded by another structure, which served as a lesche,—a very natural appendage to a large public fountain.

NOTES.

THE clearest exposition that has been given of the effect of the new maximum railway rates,—so far as they are at present settled,—is to be found in the report of the Mansion House Association on Railway and Canal Traffic, which has recently been issued. Numerous comparative tables are given, a complete copy of the new classification, and all necessary information as to the charging powers of the companies; together with a summary of the advantages and disadvantages of the new Acts as compared with the old. The conclusion is that, so far as the general conditions are concerned, they are, on the whole, favourable to the traders; while, with respect to classification and the maximum rates and charges for all classes of traffic, the decisions of the Joint Committee are regarded as equivalent to an emphatic condemnation of the railway companies' proposals. It is remarked that this goes to prove that the opposition of the traders has found ample justification; and to this it might be added that the energetic body presided over by Sir James Whitehead may be congratulated upon their share of the work. In spite of the oft-repeated declarations of the railway companies that they had no intention of disturbing their rates where they were found to be within their statutory powers, we believe that on most lines a completely new set of rates will be put into operation as soon as practicable after the date fixed by Parliament; and that, in respect of some classes of traffic, the system of charging will be entirely different from that now in force. In view of this probability, the information given in the report referred to will be of great value to members of the Association, as the powers of the companies are defined in a manner at once clear and concise. The Bills of the North-Eastern and some twenty or thirty other lines are now under the consideration of a Joint Select Committee of both Houses of Parliament, and will probably be disposed of this Session.

WE are very glad to see that the London County Council, at its meeting on Tuesday last (reported in another column), resolved to make application to the Railway Commissioners for an order calling upon the London, Chatham, and Dover Railway Company to carry out such works at the Walworth-road Station as will render it adequate to its great traffic, and will put it into a safe and sanitary condition. The state of this station has been a scandal for twenty years; repeated remonstrances of passengers have received little attention until lately, when the Company condescended to erect some 60 ft. or so of cover over No. 1 platform. The staircases are steep and dangerous, and, from the multitudes who are forced to descend them, the station was long ago not inappropriately nicknamed "the Shoot." If the County Council can succeed in compelling the London, Chatham & Dover Railway Company to improve Walworth-road Station, there are other stations on the metropolitan extension of the line that may also be taken in hand.

IN reference to the proposed destruction of Wren's Library at Lincoln, the following letter was read by the chairman, Dr. John Evans, at the meeting of the Society of Antiquaries last week, being the reply of the Dean of Lincoln to a protest from the Society against the removal of Wren's building:—

The Deanery, Lincoln,
March 19, 1892.

The Dean of Lincoln begs to acknowledge receipt of Mr. Milman's letter and enclosure.

The Dean and Chapter are acting under the strongly-expressed opinion of their highly-competent architect, Mr. Pearson, and they have no doubt that his judgment is right in the matter.

The Library will not be destroyed, but re-erected in a far better situa ion and made more available for its purpose, which is to hold books and encourage study. They have reason to believe that for lack of proper accommodation they have already lost a most valuable legacy of books.

It is, moreover, to be remembered that the cloister existed for 400 years before the library, and there is ample evidence in the other three walks for the restoration of the fourth, of which, indeed, traces still remain.

H. S. Milman, Esq.,
The Society of Antiquaries of London,
Burlington House, Piccadilly, W.

Thereupon it was moved by Mr. Higgins, seconded by Sir J. Charles Robinson, and carried unanimously:—

"That the Society of Antiquaries of London, having heard the Dean of Lincoln's reply to the Resolution passed by the Society at its meeting of March 17, desires to point out that the competency of Mr. Pearson as an architect, which the Society does not question, affects in no way the point at issue, viz.: whether it is proper to demolish a piece of architecture of undoubted historic interest and of considerable beauty to make way for a presumed

reproduction of a building which has long since disappeared, and thus to destroy a portion of the history of an important national monument;

That it is quite clear from an inspection of the plans of the cloister and adjacent buildings that ample room might be found for the extension of the library without interfering with the present buildings;

That this is the only example of a cathedral cloister of post-Reformation date in England;

And that for these reasons the Society views with the greatest possible concern the proposal to remove and thus practically to destroy this interesting example of the work of Sir Christopher Wren.'

THE case of Nickalls *v.* Briscoe, which came before Lord Penzance, the Dean of Arches, on appeal from the Chancellor of the Diocese of Rochester, is one of more than merely ecclesiastical interest. A gentleman desired at his own expense to place a new stained-glass window in Watfield Church. The "faculty" allowing him to do so was issued by the Chancellor of the Diocese, though it was opposed by the majority of parishioners, not on any tangible grounds, but because the donor was suspected of a leaning towards Ritualism. The window was characterised by Lord Penzance as being "handsome and artistic, of appropriate design and good taste." It was also, in his opinion, an improvement to the church. It was therefore clear that the faculty was properly granted, unless the fact that the majority of parishioners were adverse to the change was a valid reason against it. But, said Lord Penzance, "if a majority of parishioners is to settle the question, what becomes of the discretion,"—that is, of the Bishop? Clearly the mere wish of the majority could not prevail unless supported by valid reasons. That it is doubtful policy to force, so to say, a gift on an unwilling parish may be granted, but it is well that parishioners who object without real grounds to changes in their church should understand that a mere negative unsupported by reasons is not sufficient.

YET one more "overcrowding" case is entitled to a passing allusion, in fairness to the railway companies. Last week, at Wolverhampton, a passenger was fined 10s. and costs for travelling in a second-class carriage with a third-class ticket. The defendant in this case was a season-ticket holder, —one of the class of whom it was said at one of the recent half-yearly meetings with somewhat severe sarcasm,—that "in consequence of paying in advance they consider themselves sole proprietors of the company's rolling-stock." The action was brought by the London and North-Western Company, and the defendant did not contend that there was not sufficient third-class accommodation, but that all the third-class smoking-compartments were full, and that he consequently got into a second-class smoking. This places the matter on a different footing from the other cases to which we have recently alluded, and the conviction scores one to the railway companies. Season-ticket holders are looking after themselves just now, and it seems that the companies are looking after them, too.

THE Staffordshire County Council have set a good example in the conditions for the competition for their proposed new County Council buildings. They have not only offered the liberal scale of premiums of 150*l*., 100*l*., and 50*l*., for a building which is only to cost 18,000*l*. but they also state that the architect who receives the first premium will be employed as architect to the building, and that his commission on the usual scale will be paid in addition to the premium, instead of the too common practice of deducting the amount of the premium from it. This is really the only fair way to treat the architect in such a case, as the premium in almost all competitions affords no more than the barest return for the time employed, and it is inevitable that fresh drawings have to be made for the actual working out of the building.

IN the last issue of the Athenian *Mittheilungen* (xvi. 4, 1891), which has just appeared, Dr. Paul Wolters publishes some fragments of a "Loutrophoros" which, besides the importance of their subject, have a melancholy interest as having been the chief "find" in the very last excavations conducted by Dr. Schliemann in a piece of ground close to the new buildings of the German Archæological Institute—ground, it will not be forgotten, that belonged to the great excavator himself. The Loutrophoros, or, to give it its nearest English equivalent, "holy-water carrier," in question is one of the well-known shape, with the long, slender neck and high handles. On it is represented a stile, standing on two steps, on one of which is lying a broken lekythos. Close at hand, on a low basis, is a youth riding a horse. The fact that the horse stands on a basis is painted white instead of being the natural colour, shows that the horse is a monument and the rider the dead man. Three other youths are grouped about representing living visitors to the tomb. Dr. Wolters takes occasion to discuss the whole class of loukophoroi. They are of great interest, as we know from a passage in Demosthenes (c. Leoch. § 18), that they were placed only on the grave of the unmarried—the orator uses it as *proof* that a certain man (Archiades by name) died unmarried, that a loutrophoros stood on his tomb. They were used in marriage ceremonies for carrying water, and hence placed on the grave of the unmarried by way of compensation, perhaps, for the blessing missed. The actual terra-cotta vase was temporarily set up and later replaced by a stone copy.

THE many old-fashioned almshouses built along the Mile-end-road, and by Stepney-green, are being gradually removed. The Drapers' (John Pemel foundation) has disappeared from what was known as the Stone Bridge, Bancroft's has given place to the "People's Palace," and now the Skinners' Company invite tenders for the purchase of their freehold building-site on the northern side of Mile-end-road, in St. Dunstan, Stepney, parish. The ground, having a 51-ft. frontage to the road, covers 10,850 ft. superficial. The twelve one-storied cottages are built in two rows, with a chapel and garden at the further end. Over the gate are a carving of the Company's arms and two little figures of cripples,—these, together with the cistern, door-knockers, the pulpit and woodwork in the chapel, the two inscription stones, and other similar objects, the Company wish to retain. A modern painting of these almshouses is at Skinners' Hall: they make a pretty picture. One of the inscriptions sets forth that they were built in 1688, in the mastership of Benjamin Alexander; the other stands thus:—

The GIFT of
Mr. Lewis Newbury
BUILT By
Thomas Glover, Esq.
his Executor committed
to the Management of the
company of skinners
LONDON.

On March 21, last year, we called attention, in a "Note," to the proposed pulling down of this Company's almshouses, founded by Sir Andrew Judd, in Great St. Helen's. Next, eastwards of their almshouses in Mile End-road, stands a handsomer and larger property. "This Almeshouse / wherein 28 decay'd Masters & / Comanders of Ships, or ye Widows / of such are maintain'd was built / by ye Corpe of Trinity House / An. 1695." On the grass-plots are statues of two benefactors, — Captains Robert Sandes (1721) and R. Maples (1680). The older buildings, of red brick, and two stories high, are very little changed from what they were in the time of S. Gribelin's print; but an extensive addition has been made behind the chapel, upon the removal, in 1875-6, of the hospital at Deptford. The buildings are richly ornamented with carved work, coats-of-arms, the models of four ships, &c. Then again, a few yards further east, are the Vintners' almshouses, originally founded in Vintry Ward in 1357, erected here in 1676, and re-built, with extended benefits, under the will of Benjamin Kenton, citizen and Vintner, in 1802. Close by stood another set, which, with one at Hoxton, was established under the will (1592) of Judge Fuller, of Stepney parish. The Mercers' almshouses, on Dame Mico's foundation, were built in 1691, near to St. Dunstan's Church.

CONSEQUENT upon the death of Sir J. Pope Hennessy, M.P., a historical property is about to be sold. It is the house at Youghal, county Cork, which Sir Walter Raleigh built for himself in 1587-8, and is known as Myrtle Grove. The grounds, about five acres in extent, have long been famed for their plantations of yew, bay, myrtle, and arbutus trees. It was on a hill behind the town that Raleigh is said to have first planted the potato. The greater part of his estates here passed to the Boyle family, some of whom, together with Richard, first Baron Boyle, of Youghal, Earl of Cork, who migrated hither from Hereford, *temp.* Elizabeth, were buried in Our Saviour's Chapel of St. Mary's Collegiate Church, founded for Dominicans by Thomas Fitzgerald, *circa* 1270. Here, too, they set up monuments to Sir Edward Villiers, Viscount Grandison (1626), the popular governor of Munster province, a half-brother of George, first Duke of Buckingham, and grandfather of Barbara, Duchess of Cleveland; and to Roger Boyle, the Lord Broghill of Cromwell's day. King John gave a charter of incorporation to Youghal in 1209; a few years later Lord-Justice Maurice Fitzgerald established a religious house of Franciscans, the oldest, it is said, of that order in Ireland. Raleigh's house is a good example of the Domestic Elizabethan style, and, whilst containing some modern windows, is well preserved.

THE volume of the *Transactions of the American Society of Civil Engineers* for last November contains a paper written by Mr. Ward Baldwin on the stresses on "Railway Bridges on Curves." The author gives several general formulæ, from which the effect of the side-pressure on such structures can at once be calculated. This side pressure, due to centrifugal force, is considerable, and produces a very appreciable effect. As an example of this we may take the case of a train passing over a bridge of 100 ft. span, and at the same time round a curve of 1,000 ft. radius. With a speed of 40 miles per hour there will be a uniformly distributed horizontal pressure developed along the bridge of 16 tons. The same volume also contains an interesting paper by Mr. William L. Saunders on "Dimension Stone Quarrying." The Knox system of blasting is only a recent invention, but it is rapidly growing in America, and is being much adopted. Its purpose is to release dimension stone from its place in the bed by so directing an explosive force that it is made to cleave the rock in a prescribed line and without injury.

ON the 12th instant will be offered for sale at the Mart, a freehold building-site of some 51,800 ft. superficial, until lately occupied by the Artillery Brewery, Westminster. That property, including the "King's Arms," has frontages to Victoria-street and Strutton-ground. The sale will extend to an adjoining plot, of about 4,000 square ft., held until Michaelmas, 1904, at a reserved rent of 1*l*. per annum. Thus long has been preserved a memory of the time when the men of St. Margaret's would sally forth to practise at the butts set up there by the parish in compliance with Queen Elizabeth's ordinances. The vestry accounts for the sixteenth and seventeenth centuries contain many entries of divers sums paid for cleaning "pairs of harness," daggers, and bills; to men "for wearing the same harness" on muster-days; for powder and shot, and so on. John Locke mentions (1679) shooting with the long-bow

and stob-ball, in Tothill-fields; and Steele, in the "Tatler" says:—

"You shall have a fellow of a desperate fortune, for the gain of one half-crown go through all the dangers of Tothill-fields, or the artillery-ground . . . .

In 1720 this artillery-ground covered a space of about 300 ft. east to west, and 400 ft. north to south. The northern portion, which lay against Palmer's Alms-houses,—removed eleven years since to Rochester-row,—is now traversed by Victoria-street. According to some old maps, encroachments appear to have been begun towards the end of last century, but some of the field, westwards of Strutton-ground, is yet shown as open in R. Horwood's supplemental map, fourth edition, of 1819. Strutton-ground commemorates Stourton House, a home there of the Lords Dacre of the South. Artillery-court, Chiswell-street, Artillery lane and street, Spitalfields, and Artillery-street, Horsely-down, still remain elsewhere in evidence of our fellow citizens' bygone military exercises. The site in part of Palmer's Village, close by that under review, has been taken for head-quarters in James-street of the Queen's Westminster and of the "London Scottish" Volunteers, those for the latter being planned and designed (1885) by Mr. John Macvicar Anderson.

TWO vacant houses on the eastern side of Panyer-alley, Newgate-street, with their sites, upon an eighty years' building lease, are offered for sale. Their removal will interfere with the position of the old sign, carved in stone, representing a naked boy seated upon a pannier or basket, and holding what is commonly taken for a bunch of grapes, together with his foot, in one hand. Beneath is an inscription which says that there is the highest ground in the City; followed by the date August 27, 1688. The sign, once vulgarly known as "Pick-my-toe," stands on the pavement level; half of it is embedded in the wall of one of the two houses. This property appertains to an endowment formerly known as the parish estate of St. Michael-le-Querne.

SOME years ago the Mortuary Chapel of the Sick Children's Hospital in Edinburgh was decorated as a labour of love by Mrs. Traquair. The same artist has now completed a much more important work of mural decoration at the Cathedral Song School, on which she has been engaged since 1888. The Mortuary Chapel, a tiny room which has been spared in the recent demolition of the hospital, is an essay full of promise, with much suggestive treatment, considerable imagination, and, on the whole, exceedingly good colour. It is very pleasant to note that this former promise has been well fulfilled, the later, and much more ambitious work showing advance in every way. The Song School is a sober Gothic building by Dr. Rowand Anderson, a somewhat commonplace adjunct to Sir Gilbert Scott's prosaic cathedral. The whole of the interior from dado to wall-head has now been decorated in oils by Mrs. Traquair, who has taken as her theme the canticle "Benedicite Omnia Opera." The work is thus of considerable magnitude and importance, on a wholly different scale of effort from the diminutive chapel. Yet of the two it is the more successful; both intention and execution show marked advance; the indefinable sense of its being amateur work is greatly lessened; the colour is stronger and richer; faults of drawing are less obtrusive; and the decorative imagination is both fuller and more certain. In these qualities of decorative sense and appropriate imagination, Mrs. Traquair excels; the rendering of her theme is fresh and modern, quite free from the stock-in-trade symbolism of well-worn types at so much the square yard; the whole has evidently been a labour of love and spontaneity, and the procession of praise embodying the works of the Lord, praising and magnifying Him for ever, is full of interest and charm. Especially noteworthy is this modern spirit in the groups representing the "Powers of the Lord," the "Servants of the Lord," and the "Spirits and Souls of the Righteous," in which are introduced portrait heads of the great men of to-day, from Browning, Carlyle, and Watts, to Cardinal Newman, Father Damien, and General Gordon; the cathedral clergy and the choir are gracefully introduced, as also the workmen engaged upon the building. Faults, of course, there are, particularly in drawing. Mrs. Traquair is much stronger at ideal heads than at suggestive portraiture, and she is rarely successful with the "beasts of the field"; she lacks architectural and constructional knowledge, her architecture being more suggestive of missal-illumination than of structure. But, taken as a whole, the St. Mary's Long School is a remarkable piece of work, of great merit and much charm. It is an addition to the art-possessions of the city, and may be looked to with confidence to exercise strong influence for good on local decorative work.

THE thirty-ninth Exhibition at the French Gallery in Pall Mall, which was opened to the public on Monday, contains a remarkable work by Professor Von Uhde, who, as our readers will remember, has devoted himself a good deal to the treatment of subjects of New Testament history in a realistic spirit. It is called "Der Heilige Abend," (43) and represents a desolate snow scene on a winter's evening; in the foreground stands a poorly-clad young woman, the mother of the Christ who is to be born, leaning against a fence, while in the distance Joseph, a labouring man, is seen going off to the village to look for lodgings. Strange as is the contrast to the usual method of treating such subjects pictorically, it is impossible to deny that Von Uhde comes nearer to the simplicity of the New Testament narrative than most of the more conventionally "religious" painters. There is a true pathos in the picture, and the pictorial effect of the scene is fine and true. Fauvel's large landscape, "Les Fonds de Beaurepaire" (60), is out of place in so small a gallery, and cannot be fairly judged of except as to the fine drawing of the landscape; his smaller work, "Sheep Pastures, Brittany," can be appreciated better, and though the texture of the landscape is somewhat peculiar and crude, nothing can exceed the care and truth with which the effect of the light and shadows on the hills is rendered. The exhibition includes a small number of works by deceased artists, — Dupré, Daubigny, Corot, Millet, Rousseau, and Troyon. The larger of the three Corots, "Le Clocher de St. Nicholas, près Arras" (15) is an exquisite work, one of the most beautiful in sentiment and balance that we have seen; it is a woodland scene really, the tower only coming in in the distance and serving to give a distinctive name to the picture. Rousseau's real genius is best shown on a large scale, his small works here do not do justice to him. There is a fine little work by Georges Michel, "Outskirts of Fontainebleau" (7). Millet's "L'Amour Vainqueur" (25), which we have seen before (unless this is a repetition) shows a quality of design and composition which the painter did not often display. Among other noticeable works are Professor Seiler's "A Critical Move" (34), admirable both in the painting of costumes and accessories and in the expression of the figures; Joanowich's "Servian War Dance" (39), spirited enough in action; Poetzelberger's "The Well-known Footstep" (52), a beautifully painted interior with a figure looking through the window; C. Probst's highly-finished little scene "A Hard Bargain" (69), and Professor Firle's large painting, "A Rehearsal" (71) a very clever work in which a young woman is singing to the accompaniment of another who is seated at a piano facing the spectator. The intense and rather puzzled expression of the player, who apparently finds the music difficult, is admirable, and the whole scene pictorially effective, except that the piano forms rather an awkward mass of dark on the right of the foreground. This and other paintings here, however, are somewhat large for the scale of the room; the exhibition was originally supposed to be *par excellence* an exhibition of cabinet pictures, and had better be kept to that.

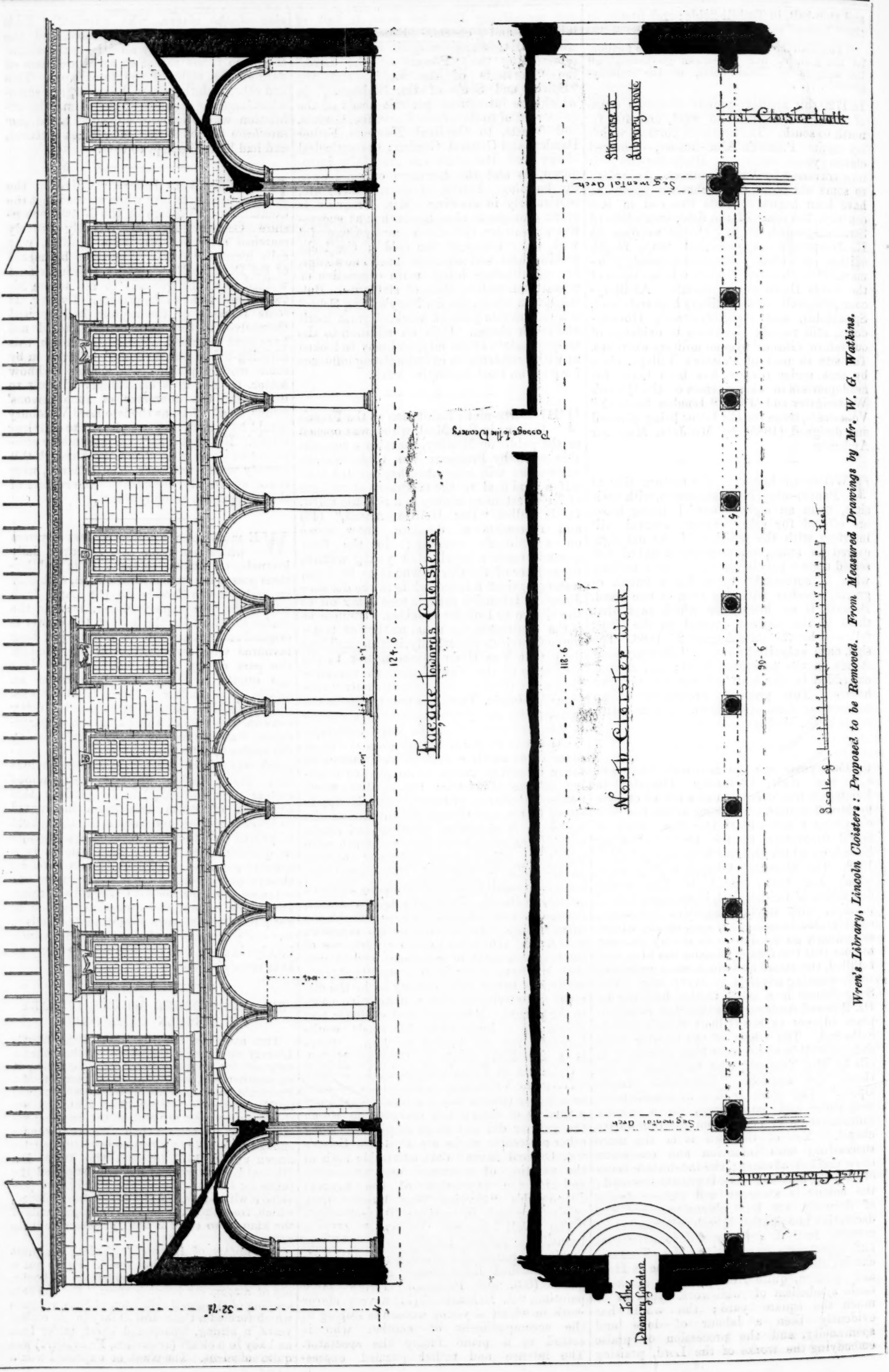
IT is difficult to believe we live in the nineteenth century when we read that the Committee of Visitors of the Northamptonshire County Asylum recently gravely marched after one Mr. John Mullins, who calls himself "Water Discoverer by means of the Divining Rod," whilst this individual walked about the grounds to see where his twig would point to the presence of water. If some inmates of the asylum had amused themselves in this manner we should not have been surprised. Curiously enough, this divining-rod nonsense is still believed in by some worthy persons who ought to know better, though it is exceedingly difficult to understand the character of such persons' minds, or of what, as the late Lord Westbury would have said, they are pleased to call their minds. But that a body of presumably competent business men should go through this comedy would not have been believed, were it not apparently, according to the reports of the newspapers, actually a fact.

WE must enter a protest against a system which has come into favour in daily journals, of quoting passages from publications possessing special information, with only an ambiguous reference to the paper from which the paragraph is taken, leaving the reader to infer that the bulk of the matter is original and not quoted. We have just been favoured with an attention of this kind on the part of the *Globe*, which a few days ago quoted a long paragraph from an article in the *Builder* of March 19 on "Steam rolling on Main Roads," merely introducing towards the end of the paragraph a parenthesis, "as *The Builder* points out," leaving the reader to infer that the rest of the paragraph was original matter. It must be obvious that the intention of this disingenuous system of quotation (?) is to produce this confusion of *meum* and *tuum* in regard to literary matter, and that it has that effect is proved by the fact that the paragraph in question has actually been quoted in a country paper as an extract from the *Globe*, though every word of the matter is from our columns. We prefer not to say all we think about this system of "quotation," which is not a creditable feature of modern journalism, but we may observe that publications which indulge in it at our expense will be likely to hear more about it.

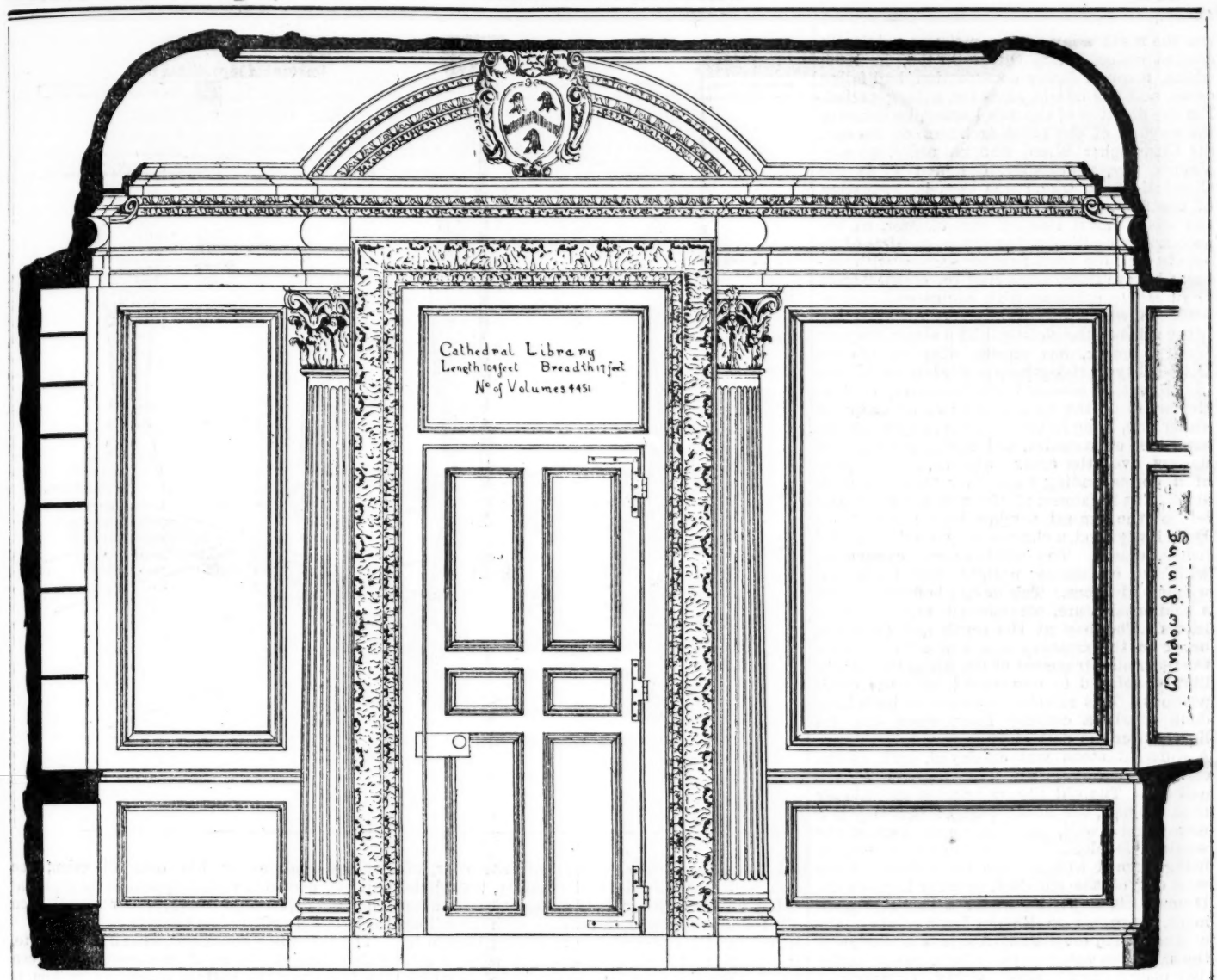
SIR CHRISTOPHER WREN'S LIBRARY AT LINCOLN CATHEDRAL.

THE attention recently directed to Wren's Library at Lincoln Cathedral by the scheme proposed for taking it down and re-erecting it on another site, according to a plan of Mr. Pearson's, on which some criticisms were passed in the *Builder* for March 12 (p. 202), will, we think, render some account of the building interesting at the present time. We are fortunate enough to be able to give a copy of the articles drawn up in 1674 between the Dean, Dr. Michael Honywood, who not only supplied the funds for the erection of the library, but provided it with books, and the builder he employed, which, from the extreme rarity of documents of the kind of so early a date, possesses no little value.

The library of Lincoln Cathedral is almost coeval with the Cathedral itself. But it was a library in the sense of a collection of books, not of a room for housing them. For the safe keeping of the small collection of MSS. volumes which formed a Cathedral library in its earlier years, a strong, iron-bound chest, under lock and key in a closet (*armarium*, Fr. *armoire*) was quite sufficient. The chest or cupboard would



Wren's Library, Lincoln Cloisters: Proposed to be Removed. From Measured Drawings by Mr. W. G. Watkins.



Elevation of Door and End wall, Wren's Library, Lincoln. From a Measured Drawing by Mr. W. G. Watkins.

stand in the treasury, or in some other strong place where it would be secure against theft or fire. A long course of years usually passed before the books outgrew these narrow bounds and required a separate chamber for their lodgment. The earliest catalogue of the Lincoln library, dating from the middle of the twelfth century, speaks of the books, not more than forty in all, being kept in a cupboard "in armario," under the charge of the Chancellor, the literary officer of the chapter.* The nucleus, as elsewhere, was a copy of the Holy Scriptures according to the Vulgate translation. It was in two volumes, and, as a contemporaneous entry at the head of the first page testifies, it was the gift of Nicholas, the first Archdeacon of Huntingdon, who was appointed by Remigus, the earliest bishop of Lincoln, and died about 1109. The name under which it is entered in the catalogue, written on the first fly-leaf of the volume, is not "Biblia," but the earlier title, found in the writings of Jerome, describing its composite character, "Bibliotheca," "the Divine Library,"—not one book, but many. Of the two volumes, the second has, unhappily, been lost for several centuries. The first is still in the place it has occupied for nearly eight centuries, a huge folio of vellum, recently rebound in strong oaken boards in the workshops of the British Museum, and preserved with all the care due to so precious a relic of antiquity, the germ from which the present library, with its thousands of volumes, has sprung. Some twelve of the forty volumes in the twelfth century catalogue are still on the shelves of the library. All belonged to patristic or canonical literature, with the exception of Virgil, Eutropius, Vegentius, and Priscian. There was also a "Mappa Mundi," which it would have been interesting to compare with that still existing at Hereford. But it is gone. The catalogue also particularises the gifts of later donors. Bishop Alexander, "the magnificent," Bishop Chesney (five of whose books are still in the library), and others, including Giraldus Cambrensis' "Topography of Ireland," given by himself.*

Where the books were kept after they outgrew the limits of the original "armarium" is not known. Towards the middle of the second decade of the fifteenth century, *c.* 1420, we find notices of a new library, "nova libraria," being built. Bishop Repyndon, after his resignation of the See in 1419, gave a book, "Petrus de Aureolis"—which, subsequently, somehow found its way into the Royal Library, and thence to the British Museum,—"to the new library to be built within the Church of Lincoln." Thomas Duffield, formerly Chancellor, who died in 1426, bequeathed another book, "Novæ Librariæ ejusdem Ecclesiæ." We may, therefore, safely place the erection of this "new library" between 1420 and 1426, a date with which the portion still remaining, forming the vestibule to Wren's Library at the east end, perfectly agrees. It was a long, low room, built, as at Wells and Salisbury, over the eastern walk of the cloister, running north and south, and approached by a newel staircase from the vestibule of the Chapter House. The existing fragment is a very good plain work of the period, with a timber-framed roof, having tie-beams slightly arched and struts, the intersections of the rafters being ornamented with boldly-carved bosses of angels and foliage. At a later period,—tradition fixes it in 1609,—the library suffered from fire, of which the charred remnants of some of the MSS. are as evidence. What was the extent of the damage done to the building and its contents we have no certain knowledge. Few books, however, seem to have perished, as the greater part of those enumerated in the second extant catalogue, *c.* 1450, which were, of course, exclusively MSS., are still in the collection. From a view taken by Lumby, the cathedral surveyor, in 1784*, supplemented by the Chapter accounts,† the damage would appear to have been made good in a mean and inexpensive fashion with timber and plaster and small casement windows, continued southwards over the east walk of the cloisters up to the Chapter House. This poor, patched-up building served as the Cathedral library till the latter part of the seventeenth century, when, on the Restoration of the Monarchy, Bishops and Deans, almost universally, set about vigorously redressing the havoc made in their cathedrals by the Puritan fanatics. The Chapter of Lincoln was then presided over by Dr. Michael Honywood, appointed Dean Oct. 12, 1660. He had been a Fellow of Christ's College, Cambridge, while Milton was a student there, and Henry King ("Lycidas") a brother Fellow. At the beginning of the Parliamentary Wars, Honywood retired to the Low Countries, where he resided, chiefly at Utrecht, during the Protectorate, devoting himself to the collection of books, of which he amassed a huge store, amounting to between 4,000 and 5,000 volumes. The whole of these Dean Honywood presented to his Cathedral, and there being no adequate place to receive so large a collection, he determined, at his own expense, to erect a building to receive them.‡ The place selected for the new building

* This catalogue, written on the first page of the Vulgate, which was the first book of the library, begins thus:—"Quando Hamoni cancellario cancellaria data fuit, et librorum cura commissa, hos in armario invenit libros." Hamon was Chancellor from 1150 to 1183.

* This, which is one of the earliest known catalogues of a Mediæval Library, is printed in the Rolls edition of "Giraldus Cambrensis," vol. vii., pp. 165-171, with notes by the late Prebendary Dimock. It will be found of great interest.

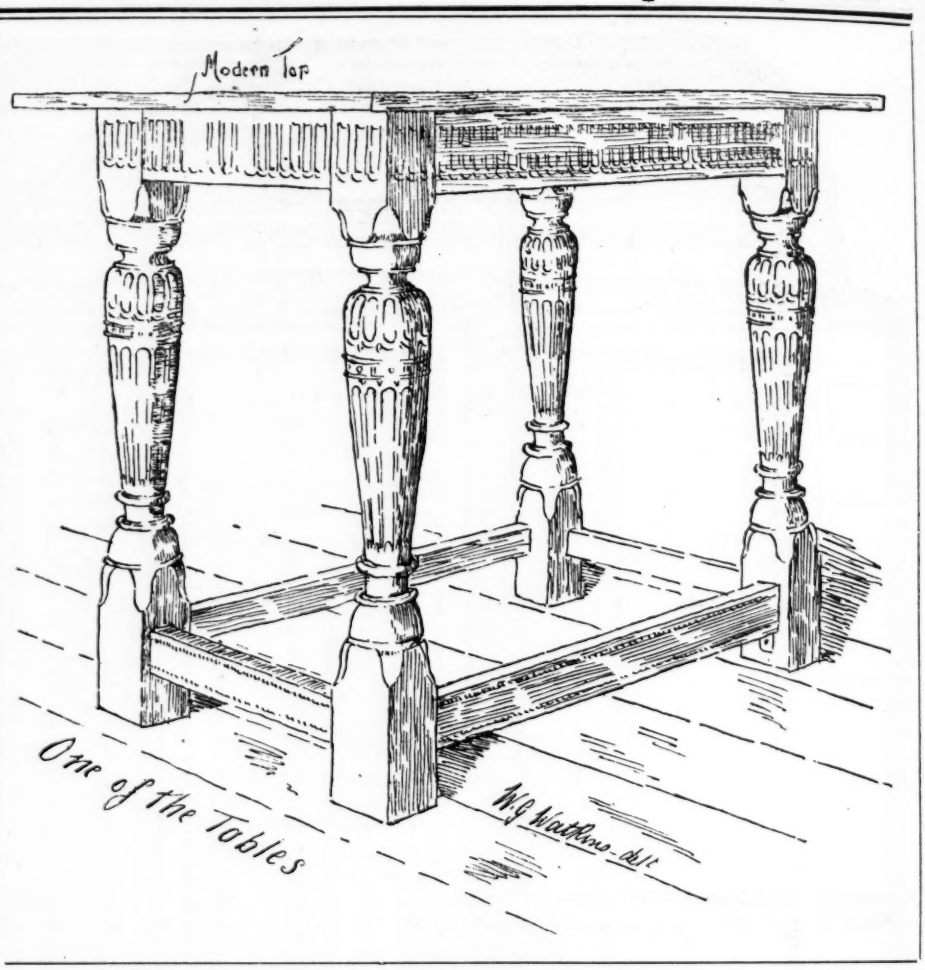
* Now in the possession of Alderman P. P. Dickinson, of Lincoln.

† The Cathedral accounts give the following estimate: 1789, "Taking down ye old library, *i.e.*, the Timber side and end, Board Floor, Joist, and Roof, £2 6s.; making good the roof up to the Front of the Library Wall, same pitch as the Cloister Roof, £4. 5s.; taking down the old Stairs, strings, and Banisters, 14s.: two shed partitions, £2. 10s.; two new window-frames, £1. 16s.; Roofing and ceiling joists, £5. 12s. 6d.; Putting up old Stairs, £6. 10s.

‡ Honywood's epitaph on the mural monument now at the east end of the south aisle of the nave contains these words, "Monumentum sibi cum libris duraturum posuit, utpote qui claustri hujus ecclesiæ dilapso in latere exstructo prius, sumptibus suis non exiguis, Bibliothecam eam postea libris nec parcis nec vulgaribus locupletaverit."

was the north alley of the cloisters, originally erected under Bishop Oliver Sutton, in 1296, which, through faulty construction, had fallen down, and had lain in ruins for a long period. For the erection of the new library, he called in the services of the great architect of the age, Sir Christopher Wren, who, naturally, we may almost say, necessarily, designed it in the Classical style, which was then in possession of the field. Wren's library, which comprises the whole north side of the cloister, as the accompanying illustration shows, consists of an arcade of nine semi-circular arches, with uncarved keystones, supported on eight Roman Doric single columns, with a clustered pier at each end, where the arcade joins the walls of the other sides of the cloister. The upper story, or library proper, has eleven windows of the Classical type, rising from a slightly-projecting plinth, set in moulded window-cases, that in the centre of the range, and two of those on either side, being further decorated by a cornice supported on consoles, and having a wreath of flowers over the centre window, and drapery of a corresponding form over those on each side. The keystones of the windows right and left of the central window bear the arms of Dean Honywood, a chevron between three cocks' heads, erased. The windows are casements, with the customary upright and horizontal wooden divisions. The design is finished with a bold entablature, ornamented with acanthus leaves. The bay at the north end (where a break in the masonry is indicated) represents the remaining fragment of the fifteenth century library, refaced to correspond with the other portions. This refacing appears to have been done nearly a century later, when the old library over the east cloister was taken down. A different stone was employed, and, as the elevation shows, the blocking-course was omitted. The old library being so much lower than the new, the upper part of this bay is a mere screen wall, and the upper part of the window is blocked, sham Gothic casements being framed within. On the outside of the west end of the cloisters, opening towards the Deanery, is a portal, under a compass pediment, supported on Roman Ionic columns, the capitals much mutilated. Above is a window of the same character as the others, but of larger dimensions and more richly ornamented, bearing Dean Honywood's arms.

Within, the library forms a long, narrow apartment, 104 ft. long, by 17 ft. 6 in. broad, and 14 ft. high. The ceiling is flat, springing from a hollow cove, and perfectly plain. The room is lighted by ten windows in the south wall, and one larger one at the west end. The entrance is by a richly-ornamented portal at the east end, the jambs of the door case carved with acanthus leaves, and surmounted by a compass pediment supported on Corinthian columns with gilt capitals. In the centre of the pediment is a shield bearing the arms of the founder. The same stately design is repeated at the west end, a window occupying the place of the door. According to Wren's plan the shelves for books occupied the whole of the north wall, the other walls and window jambs being wainscotted. This arrangement afforded sufficient accommodation for the books given by Honywood, but with no room for subsequent additions. To receive these, shelves corresponding in form and arrangement to Wren's have been set up between the windows along the south wall. This must be acknowledged to be a very inconvenient position, as no light falls on the backs of the books, and, the eyes being dazzled by the bright light coming through the windows, it is by no means easy to read the titles. In the libraries of earlier date, the books universally occupied cases running into the room, at right-angles to the walls, between the windows. The windows being on both sides, this plan afforded sufficient light for every shelf, but the cases being usually low, the accommodation for books was not large. Wren appears to have been the first to adopt the arrangement which has, since his time, been almost universally followed of shelves along the side-walls. It is commonly said that the library of Trinity College, Cambridge, was the first in which this new arrangement was introduced. But as that was not begun till 1676, nor completed till 1689, the Lincoln library, which was commenced in 1674, affords an earlier example. The book-cases rise the whole height of the wall from a plinth 3 ft. 2 in. high, which may have originally contained cupboards, but which now is filled up with shelves. They are



set in compartments, wider and narrower, of two and three divisions alternately, the whole being finished with a bold entablature running all round the room, decorated with acanthus leaves and the egg-and-dart moulding, broken in the middle of each compartment with a gilt bracket bearing a grotesque mask, below which is a tablet on which are inscribed the languages to which it was intended that the compartment should be devoted. Of these two were for manuscripts, two for Greek books, nine for Latin, one for Latin and English, five for English, one for English, French, Spanish, and Italian, one for Italian, German, Flemish, Dutch, one for Saxon, Irish, Welsh, Russian, &c. These titles indicate the breadth of Honywood's book-collecting avidity and the varied riches of his collection, which it is stated on a tablet over the doors, amounted to 4,451 volumes. The furniture of the room in the main is of Wren's time, and was probably designed by him, as that at Trinity College Library certainly was. It consists of sturdy oak tables, with moulded legs, strongly braced at the bottom, of different sizes and heights, and provided with drawers with quaint bronze handles. The sitting accommodation consists of high-backed arm-chairs, which can hardly claim Wren as their designer. The table, of which a drawing is given, is earlier than Wren, being an example of Jacobean work. The most noteworthy objects in the library are the magnificent oak desks, which evidently belonged to the old library, and which afford an excellent example of the ancient arrangement for chaining books in mediæval libraries. Unhappily, these have lost their chains, and a wooden rod has been substituted for the iron rod to which they were attached, while only cavities in the wood show the position of the hasps and locks which fastened the rod in its place. They are described by Mr. J. W. Clark, in his "Architectural History of Cambridge," as "provided with two shelves, a broad one below and a narrow one above the sloping portion,"—or desk,—"on either of which the books could be laid when not in use. The bar passes through the standards,"—which are of considerable height, and resemble the poppyheads of church stalls, —"at about six inches above the top of the desk." The arrangements for opening and shutting the casements and securing them open are very interesting. But they will be better understood from Mr. Watkins's sketch than from any description.

The erection of the library having been undertaken by Dean Honywood entirely at his own expense and under his own direction, the building accounts do not appear in the capitular records, nor, strange to say, is there any allusion to this noble gift in the chapter acts.

The following document, already referred to, which gives the terms of the contract between the Dean and the builder employed by him, is taken from a transcript made by the well-known Lincoln antiquary, Mr. E. J. Willson, recently purchased by the Dean and Chapter. Mr. Willson does not state whence he derived it, and the original has been searched for in vain among the muniments.

"Articles agreed upon and made between Dr. Michael Honywood Deane of the Cathedral Church of Lincoln of the one part and William Evison of the City of Lincoln of the other part. Jan. 2, A.D. 1674.

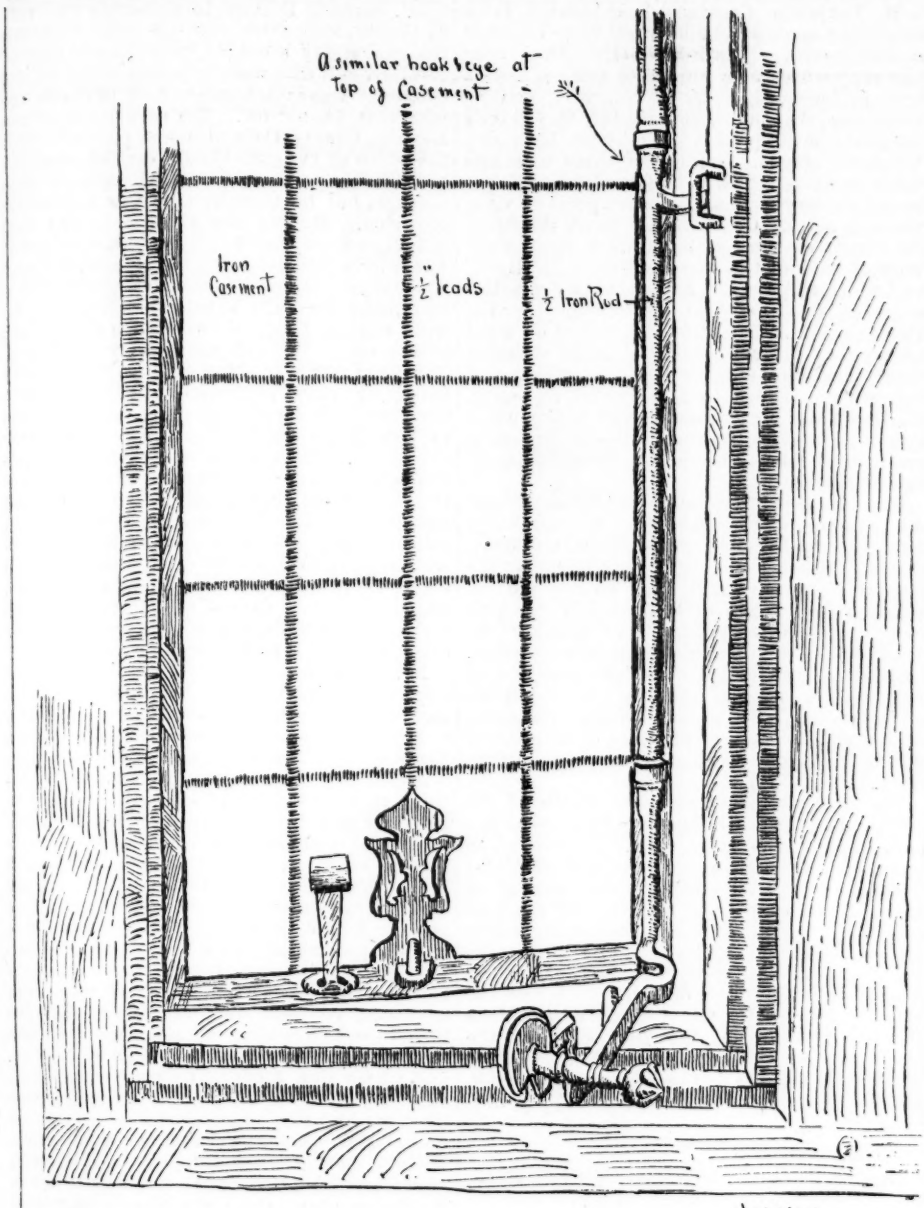
Imprimis the above-named William Evison doth for himself covenant and promise that he will before the feast of St. Martin Bp. next ensuing [Nov. 11] raise up and build a range of buildings designed for a Library and cover it with timber and lead, which will take up the whole length of the north side of the Cloyster adjoining to the said Cathedral which North side is now ruined, and that this building shall contain eighteen foot breadth within according to Sir Christopher Wren's directions and Mr. Tompsons modell, which it shall agree with and equall in all things therein specified; having one upright stone wall of the same height and consisting of the same number of stone pillars and arches and which pillars shall not have less (*sic*) than in the same modell contained and that the whole building shall be made according to the same modell and directions in all things, except what shall be in these articles hereafter excepted or thereunto in these articles added.

2. He doth also covenant and promise that he will bear all the charges of glazing as well lead as glass and all the charges of Iron with Iron barrs for the Windows, and whatsoever other Iron work the building shall be judged to require.

3. And that he will make the lead wherewith the roof is covered of the better & softer sort of lead and of substance enough to weigh seven pounds in each square foot.

4. That he converts to his own use in this building now (*sic*) of the stone of that ruined wall that is to be pulled down but only that which is not carved nor moulded & so employ what is allowed for his own use nowhere but in that building; and that he may have that parcell of lead that remains of the roof of the North Cloyster and joins to the old Library, about a yard breadth more or less.

5. That he will use no firre in this work but for the floor and stairs and boards under the lead, which should be at least an inch thick, and the two board doores, and that all the rest of the wood and timber shall be Oak and that of the better sort and well seasoned.



Sketch of Casement shewing Opening Gear

W. G. Watkins del.

6. That he will make spouts and conveyances for the water to go clear off the roof, the spouts to be lead near the ground.

7. That he will make large two-leaved doores out of the new into the old Library with railes and banisters to the steps there and also large two-leaved doores above the same stairs at the West end at the entrance into the new Library with railes and banisters at the head of those stairs.

8. That he will draw the inside walls where there are to be no shelves and both ceilings with lime and hair.

9. That he will make the timber which bears the leaden covering to rise above the plain, three foot and a halfe.

10. He doth also covenant and promise to and with the said Doctor Honywood, that he will maintaine the stone wall with Arches and Pillars upright and good for Ten Years; that is against such defects as may proceed from ill workmanship or bad materials, and no other.

11. That he will also provide Casements as well as Ironwork as glasse for every second window.

12. That he will carry off all the rubbish of the ground and leave the said North Cloyster when the work is finished fitt for pavement.

13. That he will take down the Coping of the North Wall where it is too high, & where it is on the upper part too thin, take it down and make it of sufficient thickness for such a building.

14. And the above named Dr. Michael Honywood doth for himself covenant and promise to and with the said William Evison, that he will pay to the said William Evison for the work above mentioned the summe of seven hundred and eighty pounds [£780] of lawfull current money of England in the proportion and at the times following,—that is to say, two hundred and fifty pounds in hand, and on July 1 one hundred pounds! on Aug^{t} 1 one hundred pounds more, and on Septemb^{r} 1 one hundred pounds more, and on October 1 fifty pounds more, and on Nov^{r} 1 eighty pounds, and when the work is finished, so that he takes of his workmen, one hundred pounds more.

15. And he doth also grant that the said William Evison may have the use of any pulleys, ladders, and ropes that belong to the Church, when they are not about the Church otherwise employed and that he may his lime out of the Church limekiln at the same rate as the Church payeth.

16. And the above named Dr. Michael Honywood and William Evison joyntly covenant each with other and agree that all such matters that by their part are forgotten and about which there (*sic*) any difference hereafter shall be referred to the decision and arbitration of two indifferent persons, each party then making choice of one and in case those arbitrators so chosen cannot agree in their award, that then the difference be referred to one single person chosen by those two arbitrators, and that from him there shall be no appeale.

And it is also agreed between both parties that when the Chapter Clark cames home, these articles without adding or diminishing any materiall thing shall be put into a more legall form if it be thought fit by either party, and then, this paper being cancelled, sealed, and in witness whereof both these parties above mentioned have interchangeably sett to their hands and Seales. June, A. Dom. 1674.

Sealed and Signed in the presence of
William Wyat [Precentor].
Jam. Gardiner [Sub-Dean]. William Evison."

An Electric Saw-mill.—An installation of wood-working machinery for Lord Rothschild has just been erected at Tring Park. The plant comprises band-saw and circular-saw machines for converting logs, deals, &c., as also planing, moulding, mortising, and tenoning machines, the whole of which are driven by electric motive force. The machinery has been supplied by Messrs. A. Ransome & Co., of Chelsea, and erected under the superintendence of the resident engineer, Mr. C. Burman Callow.

LETTER FROM PARIS.

It is fortunately very rare to find a genuine artist becoming the principal actor in a sanguinary drama, and quitting the pursuit of art to sit in the criminal's seat in the assize courts. Some years ago, however, the sculptor Baffier stabbed a Republican deputy who did not realise his political ideal, and now another sculptor, Lecreux, who under the pseudonym of Jacques Frame had obtained a certain notoriety, has made a murderous attempt on the life of an arbitrator of the Tribunal of Commerce. He is a typical specimen of the Bohemian class, who in 1878, in conjunction with one of his friends, Charles Gauthier (recently deceased), produced a bust of "La République" which he wished to have accepted as the official type of this head imposed by the Government on all its documents. The work had no artistic value, and could not be compared with the bust by Gautherin, the least bad production of the kind so far. From the time when he failed in this attempt he seems to have given himself up to dissipation and intrigues, terminating in a crime which seems to have been the result of an utterly disordered intellect. It is not the first time that a sculptor has had the idea of getting a bust accepted as the official type of the Republic. The Municipality of Paris even instituted a competition in 1880, in which many artists took part, with the object of securing a satisfactory and typical official bust; but the result was a failure, none of these symbolic works rising above utter commonplace.

Symbolism of another kind seems to have occupied the minds of a group of artists who have opened at the Durand Ruel Gallery an exhibition under the title of the "Rose Croix." Among the painters in this group are MM. Dereux, Aman Jean, Maurice Chabas, Henri Mertin, Durasse, Léon, and others; among the sculptors the better known names of Charpentier and Pézieux; and a Swiss architect, M. Vrachsel. The exhibition is a curious kind of reaction against realism, not without interest, but with a good deal of charlatanism mingled with it, especially in the architectural conceptions which M. Vrachsel calls "visions plastiques de l'Art," things without rhyme or reason, the nature of which may be partially guessed by their titles, "Palais des Extases," "Le Palais de l'Effroi," "Scherzo," "Le Temple du Silence" &c. After this kind of thing one quite looks forward to the annual architectural exhibits of the Salon, with their severe and sober restoration studies of Classic work!

The exhibition of the "Independants" is another artistic eccentricity which has become an annual institution and made itself a certain name. It is enlarging its borders, and on this occasion the exhibition includes no less than 1,230 works. It is held in the Ville de Paris Pavillon. The quality of the exhibition however does not progress in the same ratio with the quantity, and, as usual, its real interest is centred around a small group of names, and the remainder of the works are more or less absurd.

After the Independants the Pastellites, and after these the Engravers, have successively opened their exhibitions. In the meantime the jury of the Salon has been pursuing its labours, having commenced eight days since on the paintings. The admission for works in architecture commences to-day (April 2) and will last till the 5th. No architect can send more than two works.*

It is to be hoped that there will be seen at the Salon the monumental fountain for Tarbes, by the sculptors Desca, Escoula, and Mathet, which has already been referred to in the *Builder*. This work is 14 mètres in height, and includes a circular basin from the centre of which rises a group of figures surmounted by a statue of Aurora. The lower statues personify the principal rivers and torrents of the Pyrenees, and around the lower basin are groups symbolising the principal valleys of the country.

We may mention in the same connexion, that M. Cain, the well-known animal sculptor, has offered to the city of Paris a monumental fountain with a design representing eagles and vultures fighting over the body of a bear. It is proposed to erect the fountain in the Square Montholon.

It is proposed also to adorn presently some other public places in Paris. The statue of

* That is, two designs; each design may be illustrated by several drawings, if necessary.—Ed.

Claude Chappe, an inventor in telegraphy, will be placed on the Boulevard St. Germain, opposite the Ministry of War; that of Renaudot, the earliest French journalist, will be erected at the Marché aux Fleurs; and M. Mercié has just completed his model of the Meissonier monument intended for the "Jardin de l'Infante" at the Louvre. As will be seen, the public ways are more and more invaded by the homages rendered to departed merit.

The Commission des Bâtiments Civils has given its approval to various important works to be carried out at the Louvre and the Tuileries. These works have been the subject of a voluminous report drawn up by M. Bardoux, formerly Minister of Fine Arts, who has divided them into three categories; *travaux urgents*, requiring an expenditure of 480,000 francs; *travaux nécessaires*, for which 1.238,000 francs are required; and *travaux d'avenir*, estimated at 1,168,000. Among the "travaux urgents" is included the completion of the Jardin du Carrousel and that of the mosaics of the Escalier Daru, so much abused in Parliament by M. Antonin Proust. M. Bardoux, on the other hand, strenuously defends this experiment in the Italian style of decoration, and insists especially on the completion of the various cupolas and of the lower parts of the staircase, the marble steps of which have been hid in the cellars of the Louvre for twenty-five years back.

The "Travaux nécessaires" refer to the work necessary for keeping the buildings in repair. The "Travaux d'Avenir" concern the enlargement of the museum by the addition to it of the Salle des Etats and the Pavillon de Flore, still occupied by the Prefect of the Seine. The Louvre galleries would then occupy the whole side parallel to the Seine, and would suffice for all demands for some time to come. Although the cost is considerable, there is no doubt that Parliament will vote the money to make the Louvre worthy of and adequate to the great national collection of works of art.

At the Luxembourg, M. Bénédite has been appointed curator in the place of the late M. Etienne Arago.

At the Gobelins Museum a gallery has been opened to be exclusively dedicated to the drawings of Van der Meulen, which have been at the manufactory since the time of Louis XIV. This curious collection comprises views of the royal châteaux of the seventeenth century, the military displays of that epoch, and the sieges at which the "Roi-Soleil" was present.

Dynamite has been a good deal talked of for some time in Paris, and after having attacked private property, it is putting in peril our public monuments. The last attempt in this way has been to blow up the Caserne Napoléon, behind the Hôtel de Ville, and the explosion has seriously damaged two old windows in the church of St. Gervais. These windows with figure designs, which represented a value of at least 30,000 francs, were painted by Robert Pinaigrier, and were two splendid specimens of the art of the fifteenth century. The church of St. Gervais being at once a property of the Municipality and a "historic monument," it is probable that the Administration will take the necessary measures to secure it for the future, and save the remainder of the windows. Some reaction is required against the carelessness of the authorities in regard to the religious edifices under their care.

This carelessness is shown, not only in the religious buildings, but also in the most-frequented cemeteries, where the tombs of eminent persons are at times in a terribly dilapidated condition. A rich foreigner, of whose good taste we have several times had occasion to speak, M. Osiris, and to whom we owe the monument to Alfred de Musset, now in course of construction, has generously offered to restore a certain number of monuments. It will be curious to see if this private offer will be accepted in place of administrative protection.

We have to announce two new competitions, which will shortly be opened, one for the Hôpital Boucicaut which is to be erected in the Quartier de Vaugirard. The money has been left by the widow of the late proprietor of the "Bon Marché." The second is for the decoration of the Hôtel de Ville and includes the painting of the ceilings and walls of the large Salle des Fêtes. We may mention that the public may have an opportunity of seeing in the Salon this spring the designs executed for this Salle by MM. Benjamin Constant, Gabriel Ferrier, and Aimé Morot.

M. Benjamin Constant has painted in a masterly manner great allegorical figures against a background of dark-blue sky. M. Ferrier has represented in a charming manner flowers and perfumes, and M. Morot, who had to symbolise the dance, has copied M. Gervex's design for music, which is already in its place. Whatever may be the merit of these paintings taken separately, it is to be feared they will not be satisfactory from a decorative point of view, when in place. On the other hand, the Salon du Champ de Mars will contain a magnificent work of Puvis de Chavannes, entitled "L'Hiver," and which will worthily complete the decorative *ensemble* which has been commissioned for the Hôtel de Ville. The artist will also at once set to work on the ceiling of the grand staircase which has been entrusted to him, which was before given in turn to Baudry and Delaunay. M. Dalou has been commissioned to produce a statue in marble, for the Salle des Banquets, symbolising "Le Chanson," a former commission to Chapu.

The celebrated founder Barbédienne has just died at Paris, at the age of 81. He founded in 1838 the establishment on the Boulevard Montmartre. His success grew rapidly under the Second Empire, and in 1867 he was created Officer of the Legion of Honour, and was promoted to be Commander in 1878, after the Vienna Exhibition. For more than sixty years, besides its reproduction of antiques, the firm of Barbedienne has reproduced the greater portion of the works of our modern artists. He leaves an important collection of works of art, among which the bronzes of Barye hold a prominent place.

We have to record also the death of the painter Jean Baptiste Auguste Leloir, who has died at the age of eighty-two. He studied in the atelier of Picot, and obtained a Third Medal in the *Salon* of 1839, and a Second in that of 1841. He was especially a painter of religious subjects, and among his most important works are the decoration of the chapel of St. Louis in the Church of St. Severin, the cartoons for the windows of the Church of La Trinité, and the mural paintings in the Church of St. Jean Baptiste at Belleville. Auguste Leloir was the father of the painters Louis and Maurice Leloir, of whom he was the first instructor. The former, of whom much was expected, unhappily died some years ago.

SOME RECENT DEVELOPMENTS IN THEATRE-PLANNING:

ARCHITECTURAL ASSOCIATION.

IN the discussion which followed the reading of Mr. E. A. E. Woodrow's paper on this subject, read before the Architectural Association on the 18th ult., and printed *in extenso* in our last number,

Mr. E. Woodthorpe proposed a hearty vote of thanks to Mr. Woodrow for the very exhaustive paper which he had read to them, and also for the trouble he had taken in bringing together such a large collection of plans. The paper had, he was sure, been of great interest to them all. With what had been said by Mr. Woodrow about the advantage of getting rid of the pit in the Haymarket Theatre he could not agree. He thought it a very great mistake to remove the pit from the place which it had occupied ever since theatres had been established,—at any rate, in this country. Our English theatres did not compare at all favourably with a great many theatres in Paris and abroad, because here no support was given to them by the State; and people who built theatres found that if they spent too much money on the architecture and the site, and if they gave up much room to lounges and staircases, their theatres did not pay. Mr. Woodrow had said that he did not attempt to touch upon a great many subjects connected with theatre construction, and doubtless for that reason he had not mentioned the value of iron curtains. The first iron curtain that was put up in England was erected by Mr. Phipps in the Prince of Wales's Theatre, but its use in stopping fire had not been practically shown, and he was glad to say that there had not been a great theatre-fire in London in recent years. Mr. Woodrow had not gone into the large subject of heating and ventilation, as to which he (the speaker) was astounded by some remarks made by Mr. Phipps at a recent meeting of the Institute, to the effect that in London there was not a theatre which was thoroughly well ventilated and heated, because the owners could not afford to spend enough money on such a matter.

Mr. Bernard Dicksee, in seconding the vote of thanks, said there was one point that was not sufficiently attended to in the planning of theatres, and that was the proper width of the exits. It was even worse to have the exits too wide than too narrow. The regulations of the London County Council made provision that the width of the exits should depend upon the number of people who would have to pass through, but he thought that was a mistaken provision. He did not think that any exit should be more than 5 ft. wide at the outside—4 ft. 6 in. would be better. There should also be a handrail for every person to place his hands upon, and the exits should therefore only be wide enough to allow two people to pass out side by side. There should be a greater number of exits rather than a few of large width. The reason why grand staircases had almost entirely gone out of use was their great danger. That in Her Majesty's Theatre was particularly dangerous. He thought it should be made compulsory that on the backs of programmes the plan of the theatre should be shown, and that the exits should be clearly indicated. In reference to the remarks made by Mr. Woodrow with regard to hydraulic arrangements for the stage, he (the speaker) remembered that Mr. Phipps had said that at the Lyric Theatre he had provided hydraulic power for working the stage, but that it had never been used.

Mr. Max Clarke said that Mr. Woodrow had gone so fully into the subject under discussion that what he could say would be very largely a reiteration of what had already been said. The first thing that they had to do in designing a theatre in London was to get the new regulations to work to, for it would be possible to select six or more of the plans exhibited, which were twenty years in advance of the County Council's regulations as in force at the present time. With regard to the exits, the County Council regulations stated that the staircase must be 4 ft. 6 in. wide for a building which would accommodate 400 people. If that arrangement were carried out, there would be eighty-eight persons coming out of the door of a theatre per foot wide of opening. At the Shaftesbury Theatre, which was the first modern symmetrical theatre built in London, and which was, indeed, the most symmetrical theatre built up to the present time, there was a series of openings to the street, which totalled up to 75 ft. Supposing that the Shaftesbury Theatre held 2,000 people, there would be a provision for exit of 1 ft. for twenty-six people, so that at the Shaftesbury they were about sixty people ahead of the regulations. The regulations only asked for 1 ft. of exit for eighty-eight persons, and the exits at the Shaftesbury provided 1 ft. for twenty-six people. At the present time, according to the regulations, it was not compulsory to build a theatre of fireproof material. The new regulations stated that the dressing-rooms were to be of fire-resisting materials, but not a word was said about the auditorium; and so far as the regulations were concerned, they might construct the tiers and line the walls completely with wood, but it was a question whether the County Council would pass the plans for such a theatre; probably they would not, for although there was no written law against the erection of a wooden theatre, there was an unwritten law. With regard to theatre-building in London, there was a growing desire on the part of successful actors to be complete masters of buildings of their own, and the consequence was that there were many small theatres. In the designs of the new theatre at Amsterdam, which Mr. Jan Springer had sent for exhibition that evening, the Continental idea of theatre-building was exemplified. There was a large *foyer* or vestibule, right underneath the pit, and very wide entrances, which were divided by bars. The staircases were very wide; but supposing there were a sufficient number of handrails down a wide staircase, the difficulty which had been mentioned would be obviated. Mr. Woodrow had spoken about the balconies for the Amsterdam theatre, but he had forgotten to say that the Shaftesbury Theatre was provided with balconies on three sides to the dressing-room portion. In New York it was possible to run an iron staircase right down to the street, and that would have been done at the Shaftesbury Theatre had it been permitted. At the Théâtre Flamand at Brussels there was a series of balconies round the theatre, so close together that a person could jump from one to the other. Eventually the balconies finished at so small a height from the ground that a person could drop

into the street without difficulty. With regard to the cost of management of large theatres, the takings at the Grand Opera House in Paris in 1884 were 57,167*l.*, and yet there was a dead loss on the whole year of 650*l.* Mr. D'Oyly Carte also found that he could not keep his large theatre open without entailing a loss. Without disagreeing entirely with what Mr. Woodrow said about the absence of columns in theatres, he would call his attention to the Alhambra, where there were columns all round. Mr. Woodrow's remarks on this point might not have been understood by all of them, but what he had meant was that in small theatres like those they were speaking about, although there were no columns, the cantilevers were insignificant. But in the new Opera House and the Alhambra and the Empire Theatres the cantilevers became increasingly larger, having in the first-named building a projection of about 20 ft.; but in small theatres it was not more than 12 ft. or 14 ft. Mr. Emden's, "Terry's," "Court," and "Garrick" theatres were constructed upon a similar principle, but it was at the English Opera House that there was the greatest amount of cantilevering, which had been very successfully carried out by the Horseley Iron Company. In remarking upon the development of theatre-planning, some notice ought to be taken of the fact that although Mr. D'Oyly Carte's theatre (the new Opera House) showed a perfectly symmetrical arrangement according to the partial plan exhibited, it was very different when the whole of the plan was seen. The entrances and exits were certainly not symmetrical, and as the theatre was built upon a fairly symmetrical site and was isolated, it seemed a failure as far as the arrangement of the exits was concerned. He did not know whether Mr. Woodrow had mentioned the matter, but in New York the authorities objected to more than six seats being arranged without a gangway. In the Royal English Opera House first tier, although the doors were at the side, there was what he considered an objectionable feature, and that was that the very best position in the house for a seat,—viz., the centre,—was given up to a gangway. In the Lyric Theatre, although there were only four doors, there were two good gangways, and there were only two rows of seats between any of the doors. It was the same at the Shaftesbury Theatre, where there were six doorways round the sides. With regard to fireproof curtains, a fireproof curtain was put up in Edinburgh many years ago, which was made of some material like twisted iron wire, but it was a complete failure. But where his own curtain had been put up, and there had been a fire, the curtain had been found to answer. The only thing against which one had to guard in a properly-planned fireproof theatre was smoke. An architect had told him that a piece of cloth fixed between the auditorium and the stage was quite sufficient to keep back the smoke, and so long as this was done they did not require anything more. It was questionable whether this was the case. The owner of the Garrick Theatre had said that a fireproof curtain was perfectly useless, and so did the owner of the Royal English Opera House; but at the back of the gallery of the last-named building, right at the top, there was an air-propeller, which extracted the hot air, and it seemed to him (the speaker) that if a fire occurred in that building the extractor would draw the smoke up into the gallery. Mention had been made of the fact that Mr. Phipps had put up an iron curtain at the Prince of Wales's Theatre and he (the speaker) supposed that more of those curtains would have been erected had he not thought of something which was less costly and less in weight, and not so liable to damage when a fire did occur; and the County Council had backed up his efforts by making similar provisions in their new regulations. His own curtains had been put up in London, Liverpool, and in two or three other places, before any regulations of the kind were made by the L.C.C. With regard to staircases, the grand staircases at the Lyceum Theatre, which had not been referred to, were, though on a small scale, as successful as any. The Lyceum and Drury Lane Theatres were built by the same man, Mr. Beazeley, and he had the same ideas carried out in both theatres, which were perfectly symmetrical. At Her Majesty's Theatre the staircases were not very symmetrical, nor were they very grand. One must not forget that a theatre had to be built for a particular purpose, and in Her Majesty's Theatre there were many private boxes, and the tiers were very close together. Mr. D'Oyly Carte's theatre had been built with a small number of tiers, no boxes, and the tiers wide apart, something like the arrangement at the Cranbourne-street theatre. Mr. Woodrow had said that they should not make their staircases with more than twelve steps or less than four steps in each flight. But suppose that an extra staircase could not be put in without eighteen or nineteen steps in one flight, would it not be better to have the extra staircase than not? It was important that the tops of the staircases should be covered with separate concrete ceilings of their own. That was a very important matter, because if a theatre had a wooden roof which went right over the exit staircase, it would be bad for the people in the staircase if the roof caught fire, while if the staircase had a concrete ceiling of its own, the people passing out stood a good chance of getting out without damage. He did not think that Mr. Woodrow's interpretation of the word "pass-door" was quite right. A pass-door was one which was put in the theatre merely for the use of the management, and for no other purpose, and, if it was used by the audience, then it was the duty of the County Council to interfere. If an iron door was used,—although generally he did not believe in iron doors or iron shutters,—or some fire-resisting material, they obtained all that they required without any objectionable features. The question of sites was a very important one, but he could not make head nor tail of the County Council regulations respecting them. If they had a theatre with a passage-way round it, 8 or 10 ft. wide to the open air, that passage-way would contain all the people that the theatre would hold without any difficulty whatever. Why one street should be 40 ft. wide and why another should be 20 ft. wide was very difficult to understand. He supposed that unless they had one street 40 ft. wide on the site they could not build a theatre there at all. Again coming to the regulations, why should not the pit be more than 15 ft. below the ground? Mr. Buckle, who had published a book on theatres, had shown a design for a theatre entirely below the ground level, and it seemed to him (the speaker) that it would have been perfectly safe to have built it. Such a theatre would take a large area of ground, but why it should not be safe he did not know. There was a small point in the planning of theatres which had not been sufficiently touched upon, he thought. Most people knew that at the Exeter Theatre fire a great many people were burnt to death, and those people were burnt because a man at the top of the gallery staircase had a wooden ticket box, which was knocked down, and the first person who left that part of the theatre tumbled over the fallen box. The box had no business to be there. He thought the Lyric Theatre was the only theatre where the ticket-boxes were built into the wall. The ticket-man, too, had no business to have a chair at the top of the stairs; that should be absolutely prohibited. The Gateshead Theatre accident occurred, it was said, owing to a lighted match falling through a crack in the wooden floor and setting light to an accumulation of rubbish. It was enough to say that there should be no floors in theatres with such cavities. It was unnecessary to have the floor of granite concrete, as suggested. The best material was broken-up brick, and there was no reason why that should not be used. Granite was difficult to fix to, and the only benefit to be derived from its use was the hard wear that it would take. With regard to the ventilation of the stage, if the regulations were followed, it would be found difficult to prevent a great down-draught, as there would be, he feared, at the Cranbourne-street Theatre, where a large ventilator was to be used. He suggested as a means of curing that difficulty that a sort of velarium should be stretched over the opening, and the air would go round the curtain without producing the down-draught.

The President, in putting the vote of thanks, said that as most of them were no doubt anxious to look at the drawings, he would not detain them by any words of his own. He thought they ought to include Mr. Max Clarke in the vote of thanks for the valuable information which he had given them. They were particularly indebted to Mr. Woodrow for bringing together such a large collection of diagrams and models, and for all the trouble which he had taken.

The vote of thanks was then put to the meeting and carried unanimously.

Mr. E. S. Gale said that Mr. Woodrow had expressed his own thanks to the architects who had lent him drawings, but he (the speaker) wished to move a vote of thanks to those gentlemen from the Association.

This being agreed to, Mr. Woodrow briefly replied, and the meeting terminated.

Discussion Section.—The ninth meeting of the Discussion Section for the present session was held on the 16th ult., when Mr. E. Greenop, A.R.I.B.A., read a paper on "The Public Health (London) Act, 1891." The Special Visitor for the evening was Mr. Charles Mason, A.M.I.C.E., A.R.I.B.A., Surveyor to the Vestry of St. Martin-in-the-Fields. Mr. Greenop dealt with his subject in a short, pithy manner, and pointed out that the chief sections affecting architects were those relating to underground-rooms, drainage, and water supply; and the Special Visitor added some valuable hints in the discussion which followed the paper.

THE ATMOSPHERE OF RAILWAY TUNNELS.

No one who has travelled much by the Metropolitan Railway will be inclined to deny consideration to any feasible scheme that may be proposed for preventing the fouling of the atmosphere, which now renders such a journey a most disagreeable penance; and we are therefore glad to notice a scheme which has been proposed for the prevention of the fouling of the atmosphere of the London Underground Railways by the products of combustion.

On Saturday last this scheme was practically illustrated to a large number of gentlemen representing the engineering and other societies, and the inventor, Mr. Anderson, gave an explanatory account of the way in which the scheme is proposed to be worked.

The invention consists, briefly, of a cast-iron trunk, or foul-air duct, laid between the metals, through which the products of combustion from the engines are drawn off by means of powerful fans placed in suitable positions. Coming to the detailed method in which this is carried out, we have first of all the cast-iron duct 2 ft. 9 in. wide by 6 in. deep internally, which is put together in sections connected by indiarubber flanged joints. On the top surface of the cast-iron duct are valves 16 ft. apart, which are opened by a slider suspended beneath the locomotive as it passes over them. When the slider has opened a valve, it forms a connexion between that valve and the smoke-box, so that this latter is in direct communication with the duct as long as the slider is in contact with any particular valve. The valves are so arranged with reference to the length of the slides that at least one valve is always in contact, and at the moment of passing from one valve to the next the slider is in contact with both, hence for a moment two valves are connected with the fire-box, thus it will be seen that the fire-box is always in connexion with the cast-iron duct.

This is the great point of Mr. Anderson's invention, as it is at once obvious that if the smoke-box of a moving engine can be always brought in connexion with a fixed duct, the products of combustion may be readily taken away from the smoke-box, through the duct, by the application of a sufficiently powerful exhausting apparatus, instead of passing into the external air by the chimney in the ordinary way.

The inventor proposes to place his exhaust stations about two miles apart, and, by means of powerful fans, to exhaust one mile of duct each side of the station.

At the demonstration on Saturday, Mr. Anderson gave some particulars as to the cost of his scheme, and taking the thirteen miles of the Metropolitan and Metropolitan District Railways as a basis, he told the visitors that the complete installation of his arrangements for that distance would cost 130,000*l.*, that is at the rate of 10,000*l.* per mile. Allowing 5 per cent. interest on this sum, and the cost of working expenses, depreciation, and other outgoings, the inventor estimates the annual expenditure for the same installation at 28 000*l.* These figures are, of course, at first sight very considerable; but turning to the other side of the account Mr. Anderson considers himself justified in assuming that if the tunnels of the Metropolitan and Metropolitan District Railways were free from mephitic vapour the increased receipts from passenger traffic would

amount to 5 per cent. on the present takings of this company; this amounts to 52,000*l.* a year, hence the inventor is sanguine as to the financial aspect of his scheme. It was urged, moreover, that a considerable space of ground which is now devoted to openings for the tunnels and stations of the company might, if Mr. Anderson's scheme were adopted, be covered and built over at a very considerable profit.

At the demonstration which took place on Saturday, a light engine belonging to the Metropolitan Company was run backwards and forwards over a length of about half a mile of the duct, and, as care had been taken to feed the engine with a coal producing large volumes of smoke, the utility and efficiency of Mr. Anderson's invention was clearly demonstrated, and the contrast between the dense volumes of smoke which poured from the chimney of the locomotive while it was off the duct and the perfect absence of that smoke when the same engine was over the duct was very striking, emphasised as it was by the appearance of the smoke from the chimney over the exhaust station half a mile away.

The inventor stated that the cost of altering this engine for the purpose of fitting his invention was about 60*l.*, but intimated that in building new engines this expense would be avoided.

Certainly the very serious drawback to the health and comfort of Londoners which the tunnels of the underground railways now present would alone be sufficient to induce the directors of the railway companies to adopt some such scheme as that now proposed if they had not the fear of shareholders and dividends before their eyes; but as the inventor appears to have a good case from a financial point of view, the question ought to be considered as practically settled if Mr. Anderson is able to make good his financial statements.

We certainly think that he is within the mark in assuming that a clear atmosphere in the tunnels would increase the traffic of the Metropolitan Railway, if not of the Metropolitan District, by the 5 per cent. which he assumes. Increased traffic would, however, not be wholly profit, and Mr. Anderson certainly did not on Saturday last take any account of the increased cost to a railway company of carrying this increased traffic of 5 per cent.

It would be interesting also to know what would be the probable annual cost in repairs to keep the valves in order. Taking a double line of rails of thirteen miles in length, we have about 8,580 valves in constant process of being opened and closed by violent and sudden action every two or three minutes during about seventeen out of the twenty-four hours. How long will the system remain in working order under those conditions?

Illustrations.

ELY CATHEDRAL.*

ELY has not got what is called a picturesque Cathedral. Its great church does not occupy such a commanding position as Durham does, dominating over the city at its feet; its half-ruined west front is disappointing, after those of Lincoln and Peterborough; the reckless destruction of the monastic buildings, the cloisters, and gatehouses, gives a bareness to the precincts which contrasts painfully with the surroundings of Canterbury or Wells; and, finally, the loss of the chantry on the Green, and of the gallery or ancient connexion between the Bishop's palace and the west transept, has destroyed the continuity of structure which probably once formed an entrance-court similar to that which has been spared to its sister Cathedral at Peterborough. But, in spite of the ravages of age and neglect, the Cathedral has, for an architectural student, interests of the highest order; it has specimens of the rudest and of the richest Norman masonry; of Early English, almost cœval with that of Hugh the Burgundian at Lincoln; and it possesses examples of the work of the fourteenth century, which it is difficult to rival.

The foundress and first abbess of the monastery was Etheldreda, daughter of Anna, the ruler of East Anglia, and she is said to have been born in the year 630, at the little village of Exning, in Suffolk. When she was two-and-twenty years of age she married Joubert, an ealdorman, or prince, of the South Girvii, and the Isle of Ely was settled on her as a marriage-dower. Joubert did not live long; but died A.D. 655. The isle became her separate estate, and she settled herself in her little kingdom, and spent four years in strict retirement. At the end of this seclusion, when she must have been thirty-two years old, she married Ecgfrith, or Egfrid, of Northumbria, then a mere youth, but, after being his wife for twelve years, she became a nun in the monastery of Coldingham, where Ecgfrith's aunt was abbess. Her husband wished to carry her off from his aunt's custody, but she escaped, was miraculously saved from apprehension by his agents, and, after toilsome wanderings, reached Ely with two of her women, and in the year 673 she began to build a church, which she endowed with her estate.

The events connected with Etheldreda's second marriage maintained their hold on East Anglian sentiment, and some six hundred years after her death became the subjects of the eight pieces of sculpture which are the bases of the tabernacles which decorate the lantern piers, built by Alan de Walsingham in the time of Edward III., viz.:—

Her marriage with Ecgfrith.

Her taking the veil at Coldingham.

Her escape from Ecgfrith by means of a miraculous flood.

Her staff budding while she slept,—a repetition of the prodigy which converted the javelin of Romulus into the cornel tree of the Palatine.

Her election as Abbess of Ely.

Her death and burial.

Her translation.

A representation of a miracle wrought by her merits after she had been canonized.

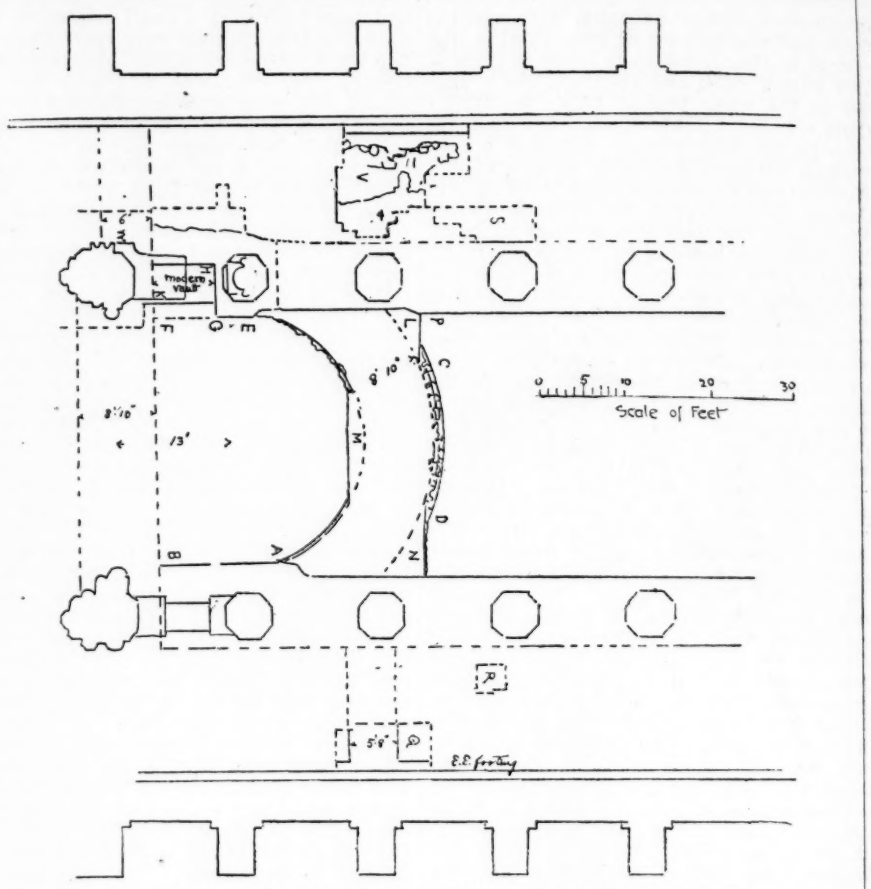
In 870 the Danes destroyed Ely, but a college of seculars established themselves there, and remained undisturbed till the pacification of England by Edgar and the revival of a stricter monarchism by Dunstan, the inspirer of Edgar's wise policy. Ethelwold, Bishop of Winchester, and friend of Dunstan, repaired the monastery, settled in it a body of monks, and appointed an East Anglian, Brithnoth, as the first abbot.

In the year 1081 William I. appointed two of his connexions, Walkelin and Simeon, respectively to the See of Winchester and Abbacy of Ely. Simeon was an old man of eighty-seven, but nevertheless he laid the foundation of the church which now exists. Shortly after his brother began a similar undertaking at Winchester, and it is instructive to remark the similarity in the plans of the two structures. If any part of Ely Cathedral can be attributed to the Abbot, it is the basement storey of the eastern transept, which was originally built with continuous aisles, like the corresponding part of his brother's church.

Under the pavement are the foundations of an apse, which Simeon intended to build on the Winchester model. These foundations were laid bare in 1850, and examined with great care by the late Professor Willis.

The result of his investigation is shown in the accompanying plan. The pavement of the whole of the central portion of the presbytery was uncovered, but the side aisles are so occupied with large monumental slabs and sepulchres that it was very difficult to find places in them that admitted of being uncovered and examined. In the central aisle are the foundations of a large apse. The centre of the semi-circle was ascertained with great care, on the spot, by planning the foundations by ordinates, and verifying the results by sticking a stake in the ground, and trying the lines of the curved walls with a string swinging round the stake as a centre. From this it resulted that the central point was 13 ft. to the east of the line, joining the centre of the great shafts of the Norman piers, which still hold their place between Northwold's work and Hotham's. The foundations of this Norman apse are entirely traversed at the sides by the foundation walls of the Early English piers of Northwold's work. It seems that the Norman foundations were not considered trustworthy by the architects, and accordingly were completely removed, as shown on the plan, and a foundation of a deeper and better construction substituted for them, which runs completely from one end to the other of the presbytery on either side. The curved portions of the Norman walls are not sunk completely down to the rock, and are built in a trench, the bottom of which is 4 ft. 6 in. below the surface level on which the Early English plinths of the piers stand. This is the most convenient datum line; for example, at C D large rough boulder stones are laid upon the bottom, forming a broad footing projecting 1 ft. 9 in. beyond the surface line of the wall, and the whole is built of rough rubble work set with a loose, coarse, sandy, yellow mortar, which in its present state has very little cohesion, and is wet.

The construction of the Early English foundation, which was carefully examined by completely trenching along the northern face of the southern wall at A B, was entirely different. It was about 6 ft. deep, rested on the rock,



Ely Cathedral Plan of Foundations of Norman Apse, etc

* This series of illustrations of the Cathedrals of England and Wales was begun in our issue of January 3, 1891. A list of those already illustrated, with particulars of future arrangements, will be found on page 276.

was formed of a kind of concrete, and the face exposed slightly overhung its base. The southern face of this Early English wall in the side aisle was not accessible, because the pavement was wholly occupied by large monumental slabs. The corresponding wall at E F on the opposite side of the Presbytery was almost entirely destroyed by a vault which had been excavated in this foundation under Bishop Redman's monument for the reception of some unknown person, apparently in the seventeenth century. The extent of this rashly-constructed and injurious chamber is marked on the plan G H K. The outer corner of the semi-circular apse and the middle of its internal curvature were filled up by portions of foundation work as shown on the plan at L, M, N, so as to convert the whole into the foundation of a straight wall of the same thickness as the circular wall.

These outside portions were certainly constructed before the Early English foundation. A very careful examination of the junction of the two walls at the northern angle P, showed that these portions had been cut through to allow of the passage of the Early English work, and that they had not been subsequently applied against its face. The first, and most natural, conjecture was that these triangular pieces had been put in to form a foundation for some transverse steps or works required for the decoration of the Presbytery. But this, for other reasons, was very improbable, even if the nature of these foundations had not shown that they were subsequent additions to the Norman work, and previous to the Early English.

These portions were built with more care than the Norman already described, and with a somewhat deeper foundation; their faces also, when exposed, appeared nearly vertical.

A sub-wall of the same thickness as that just described, namely, 8 ft. 10 in., crossed the presbytery. Connecting the great Norman piers from F to B, as shown in the plan, the centre of the wall coinciding, as nearly as possible, with the centre of the existing prominent Norman shafts. No foundations of a wall forming a semi-circular aisle surrounding the apse as at Norwich and Gloucester could be found. For the purpose of verifying the existence of this aisle and laying it down with precision, search was made in the side aisles at the places indicated in the plan at Q R S and T (the only ones practicable), and the ground in the presbytery to the east of the apse was carefully sounded. No foundations, however, of such an external aisle wall could be discovered. The whole of the central space, with the exception of a few vaults, proved to be soft ground.

In the south-side aisle at Q, instead of a curved wall, a transverse wall, 5 ft. 8 in. in thickness appeared, as shown in the plan, nearly opposite to one of the Early English piers. The mortar and construction of this was similar to the added portions of foundation L, M, N, and its want of symmetrical position with the Early English piers also shows that it was not a bond wall connected with them. The ground at R was completely soft.

In the north-side aisle the removal of the pavement disclosed soft ground at S, in the track of the supposed side-aisle wall, and at T, an irregular mass of stones V, about 1 ft. below the pavement, that would not have belonged to any foundation, but might have been the remains of a causeway, or a mere undisturbed collection of rubbish. There was clearly no transverse wall here to correspond with that discovered on the south side at Q; but a transverse wall was found in this north aisle at W, opposite to, and in continuation of, the Norman bond wall of the great piers.

This foundation was 6 ft. in thickness and its eastern face coincided with the eastern face of the central wall, as shown in the plan. It was impossible to ascertain whether a similar wall had existed in the corresponding position in the south aisle, for the whole space there was occupied by gravestones.

The interpretation of these remains appears, on the whole, to be that the original plan of the great Norman apse was circular, that it had no aisle round its eastern extremity, and that before it was completed it was resolved to convert it into a square-ended presbytery, such as we now see at Oxford Cathedral and St. Cross.

Simeon's brother, Walkelin, raised his church at Winchester on a crypt; at Ely the rock was too near the surface, and it was not advisable to have such a sub-structure in a marsh country. With this exception, the plan adopted by the two brothers was very much the same.

The presbytery at Winchester was terminated by an apse with a circumscribing aisle. The great bond wall which connects the two existing Norman piers shows that a lofty arch was erected there, probably carrying an eastern gable, from which the circular apse would have projected; and in a similar manner the square-ended presbytery, which served as the Feretory of Etheldreda and her three relations, did actually project. The change of form was probably because this square form better suited the quadruple group of shrines than the semi-circular plan would have done. The great arch must have been flanked and buttressed by walls crossing the aisles, and hence the foundation W discovered in the north aisle, to which must have corresponded a similar one in the south aisle. Peterborough, Hereford, Norwich, and many other churches exhibit this construction. These side aisle walls are sometimes pierced with arches which give access to lateral apses, or to eastern aisles when they exist. In the present case no apse was traceable on the north side, and on the south the transverse wall to the east of the one under discussion seems to show that a chapel stood there in continuation of the south aisle. This was probably the lady chapel still kept on the south side of the church."

Simeon died November 20, 1093, and for seven years the temporalities of the Abbey were appropriated by William Rufus; but on August 5, 1100, Henry I. appointed Richard, a Norman monk, Abbot, who carried on the work begun by his predecessor, and had so far finished the church that on October 17, 1106, the second translation of the remains of Etheldreda and her sisters took place. The eastern part of the church must have then been complete, and, as the Norman choir included two compartments of the nave, a good deal of the western limb must have been built. Richard may, of course, have left behind him a completed structure, but, even if he did, the present west transept and tower belong to a later school of Norman architecture, and are the work of unknown builders, except in their upper ranges, which were added between 1174 and 1189 by the third Bishop, Ridel. Hervey, who succeeded Abbot Richard, became the first Bishop of Ely, and discharged himself and his successors from any obligation to support or repair the fabric of the church. Bishop Nigel, who came next, was a member of an able family, in whose hands the financial business of the kingdom had been for thirty years; he was one of the Barons of the Exchequer under Henry II., while his son sat in the same court as Treasurer; he was a politician exclusively rather than a builder of churches, so that the history of Ely's west transept must remain a problem till some new documentary evidence solves the puzzle.

Bishop Ridel's magnificent additions to the fabric of the Cathedral are characterised by the introduction of the pointed arch, and it would be difficult to find more graceful open arcades than those erected under his direction,—forerunners, it may be, of the complete Early English style adopted by Bishop Eustace in the west porch which he added between 1197 and 1220, during the reigns of Richard I., John, and Henry III. Bishop Ridel seems to have contributed to the fabric of the infirmary, which is now imbedded in the canons' dwelling-houses, for the details of its north door are nearly identical with those of his transept windows, and the style of the opening in the central cross wall represents the Transitional Romanesque or Norman style prevalent in his day. The only known representation of the stone reredos of the Norman Cathedral is a very rude diagram made by the late Mr. Essex in the last century, and it represents the central opening as a doorway with a segmental arch and ornamental tympanum, possessing a family likeness to the features of the north door of the infirmary.

The west porch is now only a fragment of a much loftier structure built by Bishop Eustace at the beginning of the thirteenth century on the foundations of an earlier one, which may have been an original entrance to the Norman church, and it has been brought into its present condition by neglect, and by repairs of which no detailed accounts exist, which might have supplied a clue to the Bishop's whole design.

In 1757 Mr. Essex reported this porch and the west transept to be so ruinous that they were not worth the cost of repair, and advised the Chapter to take them down and "apply the materials to the use of the other parts of the church." This recommendation was rejected, and the porch must have been repaired to some extent, because in 1796 Mr. James Wyatt stated that its restoration "will neither be difficult nor expensive," and he proposed to make good all defects with "composition stucco," to plaster the vault, and wash the whole with a stone-colour wash. He "restored" the west front, but seems to have left the north and south walls pretty much in the state in which he found them. The remains of the Bishop's work have a special historical value, because they must have been built very shortly after Hugh the Burgundian laid the foundation of his cathedral at Lincoln, and the works of the two Bishops are possibly the earliest examples we have of that new style which the Rev. G. Miller so happily named Early English in 1805. Bishop Hugh is said to have become Bishop of Lincoln in 1186, to have laid the foundation of the Cathedral in 1192, and to have died in 1200; and the main characteristic feature of the portion of the church he is believed to have left complete at his death is the double-wall arcade of the east transept, which consists of a range of trefoil arches, combined with an inner range of pointed ones, both being carried by shafts of equal height rising from the same bench-table. The same design is found in the Ely porch, but with such differences or extensions as unusually thick walls afford to the resources of a skilful architect. The vault is planned in two compartments, and the face of the wall below the wall rib of each takes the form of two tiers of arcades, separated by a flat vault. The upper tier has a single range of arches, but the lower is composed of two, and represents the Lincoln feature. At Lincoln, however, the two ranges are combined, and carried by slender columns rising from the same level, while at Ely they are set apart as far as the thickness of the wall allows, and carried by shafts, whose bases are disposed at two different levels. At Ely the front range consists of three trefoil arches in each compartment, rising from a bench or ground table, while the pointed arches behind them have bases set on a high broad plinth.

If Bishop Hugh laid the foundations of Lincoln Cathedral in 1192, Bishop Eustace must have begun his work at Ely at least five years later, since his episcopate was limited to the period 1197–1220; but whether he thought out for himself an independent design for his porch, or adopted the suggestions of the Lincoln choir, he proved himself to be a consummate artist, and everyone interested in the development of English art must regret that we can now see and study nothing but the wreck of the Bishop's conception of a fitting entrance to a Norman church.

Nine years after the death of Eustace, *i.e.*, in 1229, Hugh Northwold became Bishop of Ely, and built an Early English presbytery in continuation of the Norman one, an extension of the east arm of the building, which is one of the many examples we have of churches lengthened to ennoble the shrines of founders and benefactors. Although the cost of this new work was borne mainly by the Bishop, general contributions were sought in aid of the expenses entailed by it, and the sacrists' accounts show the amount of annual subscriptions paid to them from 1234 to 1250, inclusive.

As the new building was a continuation of an old one, the Bishop placed its architectural members within and without at the same levels as in the corresponding parts of Abbot Richard's Church, and so maintained the low outer wall of the triforium, and one compartment of this Early English triforium still remains on the south side of the church.

The new building was consecrated in 1252, and the whole fabric remained without important changes till 1322, when the old Norman tower in the middle of the church tumbled down and ruined the choir beneath it.

The catastrophe was not unexpected; but the Sacrist of the Monastery and the Bishop of the Diocese happened to possess unusual architectural taste, and, as they were prepared for the disaster, Alan de Walsingham at once began the construction of the lantern, and John Hotham, the Bishop, undertook to build the three compartments which still join it to Bishop Northwold's work.

In replacing the ruined Norman choir, Bishop Hotham preserved the interior levels of the great members of the composition; but the outer wall of his triforium is high, and furnished with lofty windows filled with the tracery of

Spandril from the "Prior's Door"
Head of S. Edmund
Portion of Episcopal Chair brought by Bishop Northwold from Bury now in the north aisle of Presbytery.
Ely Cathedral
The "Prior's Door" at the NE. angle of Cloisters.

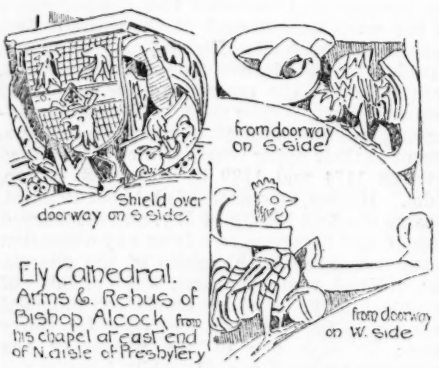
his period, and this seems to be the first introduction of the high outer triforium wall into this Cathedral. The open tracery of the high inner triforium is singularly delicate; but the symmetry of the whole design, and to some extent of Northwold's work also, is disturbed by the intrusion of a modern organ-case. In Hotham's day the floor of the Cathedral was not level, but rose gradually from the west end; the choir occupied two compartments of the nave; its stone rood-loft was in existence; and the floor of the presbytery was raised by two steps, which crossed the central aisle between the two eastern piers of the lantern.

In the south aisle of the Early English presbytery the Lady Chapel was standing over the fragmentary foundations noted in the plan of the abandoned Norman apse; but it was superseded by the magnificent structure which Bishop Montacute completed, A.D. 1373-4, and became the chapel of John Typtoft, Earl of Worcester.

Ely has fragments of the tombs of several of the bishops who helped to build the church, we can see and admire; and the chapels of West and Alcock are tolerably perfect. The tomb of Bishop De Ludd stands at the entrance of the old Lady Chapel, and belongs to that class which may be treated as open Ciboriæ, and of which Westminster Abbey possesses valuable specimens on the north side of the presbytery.

D. J. STEWART.*

In addition to the ground-plan and a general view of the Cathedral as far as the lantern from the south-east, showing the west tower and central lantern, we give illustrations of a bay of the interior of the west porch, and the ironwork,—very good of its kind,—from the late chapel of Bishop West, which terminates the south aisle of the presbytery eastward (see lithographs). For these we are indebted to Mr. S. K. Greenslade † The doorway to the cloisters from the south aisle of the nave, known as the Prior's door, is a rich piece of Late Norman, and traces of another of similar character remain blocked near it, formerly communicating with the west aisle of the south transept. In the north aisle of the presbytery are remains of a stone chair, said to have been brought by Bishop Northwold from the Abbey of Bury St. Edmunds. A lion is represented holding the head of St. Edmund, and a sculptured panel at the foot of Northwold's effigy, hard by, gives the scene of the martyrdom. Amongst a good deal of florid detail, the arms and rebus of Bishop Alcock, on his chapel, are good examples of a mode of decoration common in Perpendicular times.


Shield over doorway on S. side.
from doorway on S. side
Ely Cathedral.
Arms & Rebus of Bishop Alcock, from his chapel at east end of N. aisle of Presbytery
from doorway on W. side

* Mr. Stewart wishes us to mention that the portion of his article giving the description of the old foundations is taken from his book "On the Architectural History of Ely Cathedral."

† We will give next week a drawing of the east end of the choir (exterior) by Mr. Greenslade, which we are not able to give in the present number.

SKETCHES NEAR PETERBOROUGH.

THESE two charming sheets of sketches by Mr. Arnold Mitchell, from churches and houses in the Peterborough neighbourhood, we give along with our illustrations of Ely Cathedral, as they are from nearly the same part of the country, and will be of interest to many of those who are also specially interested in Ely.

The subjects speak for themselves. As examples of refined and artistic architectural sketching our readers will agree that the drawings can hardly be too highly praised.

ARCHITECTURAL SOCIETIES.

EDINBURGH ARCHITECTURAL ASSOCIATION.—On the 24th ult., Mr. John James Burnet, of Glasgow, read a paper on "The Relative Position of the Architect and the Craftsman," to the members of the Edinburgh Architectural Association, in the Hall, 42, George-street. Mr. Burnet said he was of opinion that there never had been an age when the life of the individual was more governed by the practical necessities of the day, nor the demand upon him more clearly defined; and therefore never before was the architect's problem, if varied, more easy of enunciation. Defining what an architect of the present day was, he said he was first a master builder, having a thorough knowledge of the science of building and of the crafts engaged in building, keenly appreciative of the possibilities of each, and ingenious in their application to the needs of his fellow-men, and he was also the poet of modern necessity. If they accepted that definition then they might easily permit, or even recommend, the registration of master-builders, as, while all of them could not be architects, all architects worthy of the name would be proud to call themselves master-builders, and would be pleased that while on the one hand the public might be protected against the device of incompetent professional men, the profession would also be protected against the degrading results of their incompetency. Describing the function of an architect, he believed the most important factor was that he should have the confidence of his clients, and that harmonious working of the craftsmen without which it was impossible that the work could be satisfactorily accomplished. The modern architect must be prepared to act, if his work was to have any of the grandeur and nobler qualities of master-building with the keenest and most detailed appreciation of the crafts, his particular work being in their co-relation and the co-relation of the contributory arts. If the work was to be true architecture it must not only be suitable for its purpose, but it must be the work of one man executed by craftsmen and artists each free to the development of his own art or craft, with that individual liberty of thought and action without which art in any form was impossible, leaving it only to the hand that guided him to his work to restrain him in its execution. Passing on, he said that they would agree with him that the handing of schedules to tradesmen, or advertising for tenders indiscriminately was one of the greatest weaknesses of the present contract system; and he concluded by throwing out a few suggestions, in the course of which, addressing himself first to the architects, he said that they should dread no advance in science, whether in economic production or in form of demand; and that they should persuade their clients against an indiscriminate issue of schedules, which made the skilled craftsmen's work appear costly by contrast with that of his less skilled brother. He advised the craftsmen to study their craft and the theories which underlie its practice, so that they might not fail to see its application to the work to be executed.—Mr. Burnet was accorded a hearty vote of thanks at the close of his paper.

LEEDS ARCHITECTURAL SOCIETY: STEEL APPLIED TO CONSTRUCTION.—At their meeting in the Law Institute, Leeds, on the 28th ult., members of the Leeds Architectural Society listened to an interesting and practical lecture on "Steel as Applied to Construction," delivered by Professor Goodman, of the Engineering Department of the Yorkshire College. Mr. W. H. Thorp presided. The lecturer gave a comparison between timber and cast-iron, wrought iron and steel, pointing out the irregularities and defects of cast-iron, and its low tensile strength. Wrought-iron, he showed, was considerably stronger, but very inferior to the best qualities of mild steel. By using iron and steel any structure could put in much bigger spans and take up less head room. Steel, until recently made by the Siemens process, was now very largely made by the Basic process, and

first-rate material was turned out by the various steel works in Leeds. The strength of each varied from 30 to 32 tons per square inch, and stretched 25 per cent. before breaking. A much stronger steel could be made, but it was brittle, and not so reliable for structural purposes. Steel was liable to hidden defects, which could only be detected by testing. It required more careful handling than wrought iron, otherwise it might be very seriously damaged. Although from 30 to 50 per cent. stronger than iron, it was only about 10 to 12 per cent. stiffer, consequently steel girders deflected more in proportion than iron. The following officers were elected for the ensuing year:—President, Mr. G. B. Bulmer; vice-presidents, Mr. H. B. Buckley and Mr. J. H. Greaves, and the past presidents of the society; hon. treasurer, Mr. W. A. Hobson; hon. librariarn, Mr. J. Mettam; hon. secretary, Mr. W. Carley Hall; Council, Messrs. W. Watson, C. H. Thornton, A. Neill, E. J. Dodgshun, Beevers, and Marshall; auditors, Messrs. F. Musto and F. W. Bedford.

THE LONDON COUNTY COUNCIL.

The usual meeting of this Council was held on Tuesday afternoon last at Spring-gardens, the Chairman, Lord Rosebery, presiding.

Tenders were received for alterations, &c., at the Southwark Gas-meter Testing Station. They will be found amongst our lists of tenders.

Finance.—The Finance Committee reported that they estimated that it would be necessary to borrow the sum of 5,761,748*l.* during the present year, including 2,215,000*l.* to be lent to other bodies, the amount required for the Council's own purposes being 3,546,748*l.* The estimate was referred to the Parliamentary Committee in connexion with the preparation of the Council's Money Bill, which will this year be introduced as a private Bill, and not under the auspices of the Government, as has hitherto been the case. Some discussion arose out of some proposals for loans to local bodies, on the vexed question of the relative advantages of the annuity and the instalment systems of repayment; and complaint was made of the action of the Treasury in vetoing a loan proposed to be made to the Shoreditch Library Commissioners, at the desire of the Commissioners and with the sanction of the Local Government Board, on the annuity principle of repayment. The Commissioners desired that system of repayment, it was stated, because, if the loan were repaid on the instalment principle, it would leave them no money wherewith to purchase books during the next few years. As the Treasury had refused to sanction the loan being granted by the County Council on the annuity principle, the Library Commissioners had arranged to borrow the money from an insurance company. Eventually it was decided to raise the question at a future meeting of the Council.

The Easter Holidays.—On the motion of Mr. Benn, it was resolved that the Council should adjourn for the Easter Recess on Tuesday, April 12, and meet again on Tuesday, May 3.

Mr. Tate's Offer.—On the motion for the adoption of the Corporate Property Committee, Mr. Evan Spicer moved

"That it be referred to the Corporate Property Committee to report whether there is any land on the Thames Embankments, or elsewhere, belonging to the Council which would be suitable to offer to the Government for the purpose of building the picture gallery offered by Mr. Tate."

He reminded the Council that Mr. Tate had offered pictures to the value of about 80,000*l.*, as well as a sum of 80,000*l.* for the erection of a building, if a site were provided. The Government had not been able to find a site, but he thought it was very important that London should not lose the benefit of that munificent offer. In answer to a question from the Chairman, it was understood that Mr. Spicer proposed that the Council should give a site for the proposed gallery.

Bars and Gates.—The Highways Committee presented a report relating to a reference made to the Committee during the last Council as to the controlling authority of the gates in Harley-street and Portland-place. It appears that the gates are under the control of the Commissioners of Her Majesty's Works, and the Committee reported that in their opinion no effective steps could be taken for the removal of the gates until the Council should see fit to promote a Bill for the removal of all such obstructions in the streets of the metropolis. The Committee added that in due course they intended to submit a recommendation upon the subject.

Walworth-road Railway Station.—The same Committee's report also contained the following paragraph:—

"We have had before us a report by the Architect (ordered by the Sanitary and Special Purposes Committee before the transfer to us of the reference under this Act), as to the state of the Walworth-road Railway-station, and what steps had been taken by the company to remedy certain defects at the station. In July last the company was furnished with a statement of the Council's grounds of complaint and the relief or remedy to be claimed, and at the same time the company was asked what measures it would take to remedy the matters complained of. To this the company replied, in September, that plans would be prepared for the improvement of the station, and that the works would shortly be proceeded with. The Architect now reports that certain alterations which have been carried out, although improvements, do not in any way remedy the defects which he had previously reported, namely, amongst others (1) bad arrangement of ticket-office and absence of waiting-room in connection therewith; (2) bad arrangement and ventilation of urinals; (3) want of protection to the skylight over the passage-way from anything falling upon it from the railway, and (4) steepness of staircases. We are of opinion that measures should be taken for effecting improvements in these matters; and we therefore recommend—

'That an application under the Railway and Canal Traffic Acts be made to the Railway Commissioners for an order enjoining the London, Chatham, and Dover Railway Company to carry out such works at the Walworth-road station as will remedy the defective arrangements there.'"

The recommendation was agreed to without discussion.

Toole's Theatre.—The Theatres and Music Halls Committee's report contained the following paragraph and recommendation:—

"On July 23 last a draft notice was transmitted to the owner of Toole's Theatre, King William-street, Strand, containing certain requirements which were, in the opinion of the Council, necessary in order to render the premises safe for the reception of the public. We have since conferred with Mr. Toole's architect, and it appears that it would be quite impossible to carry out the principal requisitions within the limits of the present site, and further, that the Council of Charing-cross Hospital, who are the landlords, have passed a resolution to the effect that they had no premises they could lease to Mr. Toole for the extension of his theatre. Mr. Toole's lease has only three and a-half years more to run, with the option on either side of its being renewed for another seven years. We are of opinion that all the requirements mentioned in the draft notice are absolutely necessary, but it appears to be impossible to carry them out. The minor requisitions which could be done would, in our opinion, remedy matters but very little. Having fully considered the case in all its bearings, we recommend—

'That Mr. Toole be informed that, though the Council considers the present condition of the theatre unsatisfactory, it recognises that the conditions cannot be adequately altered, except by practical rebuilding, and the Council is, therefore, willing not to proceed with the requisitions contained in the draft notice, if Mr. Toole will give an assurance that neither he nor any assignee of his will renew the lease of the theatre when it terminates in 3½ years' time.'"

This led to some discussion, in the course of which Mr. E. Bowen Rowlands moved that the report be referred back. He said he thought the recommendation made by the Committee was most inconsistent and weak. Either the theatre was dangerous or it was not: if dangerous, it ought to be closed or pulled down. The Rev. Fleming Williams having seconded the amendment, Mr. Routledge, Mr. Russell, and Mr. Emden defended the Committee's report and recommendation as embodying the only course that could be taken without inflicting great hardship on Mr. Toole. Mr. Stockbridge supported the amendment, which was, however, lost, only 9 members voting for it.

The London Water Question.—Sir Thomas Farrer, upon the presentation of a report, with correspondence, dealing with the London Water (No. 1) Bill, stated that the constituents of the present Council had entirely approved the policy of the late Council on this subject. In proof of that he would quote from the *Economist* the statement that there had been a great fall in the price of the shares of the water companies. Between the date of the elections and March 19 the fall in the price of the shares had ranged from 2½ per cent. to 17½ per cent., and on the whole the average fall was from 8 per cent. to 10 per cent. That fall had been, as he thought, rightly attributed to the consciousness on the part of the companies of the fact that the population of London,—the voters of London,—approved of the Council's policy on the water question, and intended to follow it out. Still, the realisation of that policy was no easy matter, although they were in accordance with the views of their constituents. There was a great deal to be done, and one of the most important questions to be decided was—What were to be the future sources of supply? Upon that question the Special Committee of the Council were preparing evidence to lay before the Parliamentary Commission. He asked to be allowed to move a resolution to the effect that the Council adopted the policy of the late Council in regard to the water question, and approved of the London Water Bill.

The Chairman said he did not think he could take so large a resolution without having received previous notice of it; but, on the motion of Mr. C. Harrison, the report was received, and it was resolved to proceed with the Bill.

The Salary of the Deputy Chairman.—Mr. Elliott proposed, "That the resolution of November 7, 1889, fixing the salary of the Deputy-Chairman at 1,500*l.* a year, be rescinded." Mr. Fletcher seconded the motion.

Dr. Longstaff moved, as an amendment, "That as the Council has recently appointed a Committee to consider the organisation of the Council's business, it be referred to that Committee to consider and report as to the duties and emoluments (if any) of the Deputy-Chairman." Mr. Westacott seconded the amendment, which was lost by a large majority.

Mr. Thornton then moved a further amendment to the effect that the amount of the salary be £1,000 per annum in the future. Mr. Hubbard seconded the amendment, which was also lost by a majority of 16,—by 59 to 43.

The original resolution of Mr. Elliott was then submitted, and a division was taken, with the result that there were for the motion, 49; against, 53; majority against, 4.

After transacting other business, the Council adjourned.

BUILDERS' CLERKS' BENEVOLENT INSTITUTION:

FOURTEENTH ANNUAL DINNER.

THE fourteenth annual dinner of this Institution was held on Wednesday evening last in the Venetian Saloon of the Holborn Restaurant, Mr. Colin G. Patrick, President, in the chair, supported by members and friends of the Institution to the number of 254, including Messrs. W. R. Freeman (John Mowlem & Co.), B. E. Nightingale, W. A. Colls (Colls & Sons), B. Hannen, jun. and E. C. Hannen (Holland & Hannen), Joseph Randall (Kirk & Randall), J. W. Hobbs, J.P. (J. W. Hobbs & Co., Ltd.), E. S. Rider (Rider & Son), H. D. White, Geo. Pearson, and J. G. Drower. The usual loyal and patriotic toasts having been honoured, Captain Roe responding for the "Army, Navy, and Auxiliary Forces,"

The Chairman proposed the toast of the evening, "The Builders' Clerks' Benevolent Institution." The Institution, as they were aware, was founded for the relief and the granting of temporary pensions to decayed builders' clerks, and for granting pensions to the widows of builders' clerks who might be left unprovided for. In addition, the Institution had within the last few years started an orphan fund, which had been found very useful in giving a start in life to the orphan children of builders' clerks. In order to make the charity as far-reaching as possible, the amount that could be paid to any one pensioner was limited. The Institution had now a sum of between 4,000*l.* and 5,000*l.* invested in Consols. Although he was glad to see that they had a most influential list of subscribers to the funds of the Institution, including not only builders, but merchants and others intimately connected with the building trade, he was sorry to find that there were a great many names absent from the list which ought to be there, and names of repute too. He believed that there were between 3,000 and 4,000 master builders in the London district. Now if they could only get a subscription of one guinea from each of those firms, what a splendid position the Institution would be in! He was speaking only of the builders, not of the merchants. Why, the little blue-book of the Institution ought to be as thick as "Laxton," and it ought to contain as many figures. It certainly could not be said that the building trade was overridden with charities. The master builders had their own excellent Builders' Benevolent Institution for those of their number who had been unfortunate; then there were the Provident Institution of Builders' Foremen and Clerks of Works, and their own Institution, so that he did not think it could be said that the building trade, as a trade, was overdone with charitable institutions. At any rate, he was quite sure that there was no society connected with the building

trade which had greater claims to their support than the Builders' Clerks' Benevolent Institution. It was greatly to be wished, however, that a greater number of builders' clerks would interest themselves in the Institution. There were probably 10,000 builders' clerks in the London district, and, if they would each give but a small annual subscription, the Institution would not only be able to meet all demands upon it, but would probably have no further occasion to appeal for outside aid. In conclusion, he asked the company to drink with him "Prosperity and Success to the Builders' Clerks' Benevolent Institution."

The toast was very heartily received.

Mr. W. A. Colls next proposed "The Architects and Surveyors." The architects, he said, sometimes grumbled at the builders, and the surveyors did not always give them the prices they desired; nevertheless, the builders were very frequently much indebted to those gentlemen. With the toast he coupled the name of Mr. George Pearson, who briefly replied.

Mr. J. E. Drower proposed "The Builders," saying that as a surveyor he was able to bear testimony as to the excellent manner in which the principal builders of London carried out their contracts, turning out the best work they could for the money they got. But, greatly as he respected the builders, whenever he came to think of builders' clerks he always felt inclined to take off his hat and make a deep obeisance to them, because they were the gentlemen who were responsible for those remarkable documents called "Prime Cost Accounts," according to which any builder must infallibly go to ruin if he did not get 15*l.* per rod for brickwork; and yet the same gentlemen would price-out any number of rods at 12*l.* 10s.! How that came about was a problem which he regarded as insoluble. With the toast he had much pleasure in coupling the name of Mr. Joseph Randall, of the well-known firm of Kirk and Randall.

Mr. Randall, in responding, expressed his acknowledgments of the appreciat ve words which had been uttered by Mr. Drower regarding the London builders.

Mr. W. R. Freeman proposed "The Merchants, to whom, he said, the Institution was much indebted for generous support. He paid a high tribute to the good qualities of builders' merchants, observing that, no matter how sorely those gentlemen were tried, they were always amiable and obliging and ready to do the best for their customers. He thought that in many cases difficulties could be smoothed over if the merchants and dealers in specialties could more often be brought in direct contact with the architects. At present the builder had not always an enviable position between architect and merchant. With the toast he had great pleasure in coupling the name of Mr. J. Nicholls, of the firm of Nicholls & Clarke.

Mr. Nicholls briefly replied.

The other toasts were "The Past Presidents" (proposed by Mr. Edwin Brooks, Treasurer of the Institution, and coupled with the name of Mr. Benjamin Hannen, jun., who was President last year); "The President" (proposed by Mr. J. W. Hobbs); and "The Visitors" (proposed by Mr. B. E. Nightingale, and responded to by Mr. F. Dashwood, Secretary of the Clerks of Works' Association).

During the evening, subscriptions and donations to the amount of 314*l.* 9s. 6d. were announced by the Secretary (Mr. H. J. Wheatley). This sum included 26*l.* 5s. given by the President, and 10*l.* 10s. given by the Worshipful Company of Carpenters, the total of the President's list alone being 211*l.*

WORKS OF REFERENCE.

"The City of London Directory for 1892" (London: W. H. & L. Collingridge, *City Press* office), presents, in this its twenty-second annual issue, all its old excellent features and many new ones, and we can speak from experience as to the reliability and exactness of its information relating to the City and City institutions. An excellent coloured map of the City, to a large scale, accompanies the volume, but, as we have said before, the usefulness of this map would be enhanced if it were mounted on linen in the same manner as the map in the "Post Office London Directory."

"The Newspaper Press Directory" for 1892 (London: C. Mitchell & Co., Red Lion-court, Fleet-street) is the forty-seventh issue of what is the oldest book of reference of its kind. Though it has now many competitors, it more than holds its own, and the present issue contains many useful features. Besides a revised alphabetical list of the newspapers, periodicals, and magazines of the United Kingdom, there is a supplement relating to the press of Australasia, South Africa, and India, while particulars are given of the principal journals of all foreign countries. The notes of recent cases as to the law relating to the press, by Mr. W. F. Finlason, chief of the law reporting department of the *Times*, will be found very useful. A new feature of some interest is occupied with portraits and memoirs of deceased pressmen of distinction.

"Willing's (late May's) British and Irish Press Guide" (London: Willing & Co., 162, Piccadilly) is the nineteenth annual issue of a very compact and well-arranged handbook and directory for advertisers and readers.

"Shelley & Co.'s Complete Press Directory for 1892" (London: Shelley & Co., 38, Gracechurch-street) is the sixth appearance of the work, a useful feature of which is the summary of leading newspaper law cases for the year 1891.

"The Garden Oracle and Illustrated Floricultural Year-book, 1892" (London: *Gardeners' Magazine* office, 4, Ave Maria-lane) appears this year in a new dress, and has been considerably enlarged. The "Oracle" was ably and successfully conducted for thirty-three years by the late Mr. Shirley Hibberd, the Editor of the *Gardeners' Magazine*, and the present issue has been compiled by Mr. Hibberd's successor in the editorial chair. It is full of useful information, and among the new features is a section devoted to the enumeration and brief description of the public parks and gardens of the country, but this is by no means complete. Glancing at it haphazard, we find, for example, Exeter and Southampton absent from the list of towns having public parks and gardens. This section will no doubt be made more complete in future issues of the work.

Correspondence.

To the Editor of THE BUILDER.

THE LINCOLN LIBRARY QUESTION.

SIR,—I have just read with painful interest Mr. Somers Clarke's letter about the "restoration" proposed at Lincoln. As an outsider, being a clergyman, unconnected with the S. P. A. B., or, in fact, any society of the kind, I venture to ask your leave to endorse every word of his letter. It is more than lamentable,—it is monstrous, that some semi-public, semi-private bodies, like the chapters of Lincoln and Westminster, the governing fellows of Pembroke College, Cambridge, the vicar and churchwardens of St. Helen's or St. Stephen's, should have the power to do what they have done, or contemplate doing. We want a law like that of France as to "national monuments."

March 26, 1892. W. J. LOFTIE.

SIR,—I venture to think that in Mr. Somers Clarke's excellent letter of last week he has not done full justice to the late Sir Gilbert Scott. I have it in my mind that when Sir Gilbert Scott was engaged in the restoration of Ripon Cathedral some thirty years or so ago, he was called on to take down the Lady-loft, now the Library, an addition of the fourteenth century to the early apsidal chapel, which forms the Chapter-house and sacristry on the south side of the choir, in order that this chapel might be restored to its supposed original condition.

This, Sir Gilbert Scott, to his great honour and credit, declined to do, and we may, therefore, reasonably assume that Sir Gilbert Scott would have acted at Lincoln as he did at Ripon, and would have been on the side of preservation.

CHARLES J. FERGUSON.

BUILDING-STONES IN IRELAND.

SIR,—The article on this subject in the *Builder* of March 26 gives some condensed information that it may be worth some man's while to pigeon-hole as a geological memorandum, but for practical or commercial considerations it is of little value to anyone. The game of seeking most of the stones set out in the list is not worth the candle, and never will be. As to the kindly bit of sentiment that winds up the article, we almost inevitably look when Ireland or Irish industries are brought up for a little poetic touch about "long-faded glories," &c., and "decay of arts and industries" and their "revival," which practical people, who are not professional patriots or poets, in Ireland know had never any existence to be decayed from. "Surely," says the sanguine writer, "such a state of things in importation of stone will not exist much longer."

It has so existed from very early times, and is likely to exist. The hewn stone in the vast majority of the Mediæval buildings in Ireland is an English oolite, and we know the district of its source from records of cargoes occasionally impounded at Bristol, and it is unmistakeably the same species of stone as is found at Glastonbury and Montacute. It is nearly universal in Ireland wherever stone could be water-borne, and there are not many places that could not be reached by water-carriage from the sea-board *viâ* rivers, lakes, and creeks. It is the ancient stone of the Dublin Cathedrals and Castle, and of such ancient churches as there are remains of. It is the stone of Tintern Abbey, in the extreme south-east, in Wexford; of Altrassel Abbey, in Tipperary (close to abundant granite and limestone); of the French Abbey of Mellifont, mentioned in the article, lying beside the Drogheda limestone quarries, in the midland county of Louth; and is found far north at Grey Abbey, lying close by those sandstone quarries of Scraboh, county Down, commended by the article, and in hundreds of the ancient buildings that lie between these places. The facilities of water-carriage, or the familiarity of English builders with English stone, does not account altogether for this nearly universal employment of a Somerset oolite.

People who write magnificently about the development of Irish mines and minerals are apt to leave out of sight the peculiarly contorted and fire-affected geological system of Ireland, and form their notions on the business-like and well-behaved strata, reliable to be found in their proper place when looked for, in England. As to your Irish stone,—you are rarely sure where you can get at it, or when found how you will get it out of the quarry, or what it will be like to work when you get it, or how at any reasonable cost you can get it to your building. In a great number of the localities indicated in the *Builder* article, no industry of stone raising ever did exist or ever will be started. Here and there, in a century, a quarry has been opened to get a few quoin-stones and window-cills for the big plain house the Irish country gentleman used to build. Now, the country gentleman of Ireland builds no house, and local demand for the local stone there never will be. But lately I was architect of a cut-stone mansion for an Irish country squire,—about the last of his race likely to build an Irish mansion,—and we proceeded hopefully to build that house from a quarry of promising sandstone three miles from the house. It is one indicated in the *Builder* article. It was not long until, to my disappointment, it was proved that Portland stone shipped to Dublin, trans-shipped across that city, carried by rail 87 miles, and carted 5 miles was much more economical! Flagstones are referred to as near this same district, and also at Carlow and elsewhere. So there are plenty of flagstones, but who wants them, or is ever likely to want them, now? The Avigna quarries in the Leitrim coal-fields, for instance, will find you big flags,—cheap for flags,—say for a yard super., 2s. 3d.; add carriage to Dublin and cartage, say 2s. 3d. more, and you have it laid in Dublin at certainly not less than 6s. per superficial yard. You have then a rough kind of floor at best. Who is likely to want such flags, when a beautiful granolithic cement floor can be laid for 2s. 6d. or 3s. per yard? Carlow flags are spoken of as worth consideration. Why, Carlow flags of old Dublin houses are one of the horrors of the basements of that city, black, moist, and unsanitary, and they are being rooted out everywhere, to be replaced by concrete or dry tiles. In fact, with the development of the cement industry, the day of flagstones is over. For no useful purpose that I can see will flags be ever quarried in Ireland again.

Take, again, as an example, under head of "*Dublin*," a stone described approvingly as of the "arenacious rocks belonging to the carboniferous system such as found in the Windmill Quarry, Rathgar." This once prevailing stone, locally known as "the Calk," has been the curse of Dublin, and chief cause of its ruinous condition century after century. It is now utterly discredited and unmarketable, except to mend roads with, for which purpose it is about the very worst stone to be found in the British Isles. It is a hard, indurated clay, which softens and reverts to its ancient condition of mud if it gets water enough. It used to be universally used for foundations. Since

the Vartry water supply came into Dublin, and all lower Dublin became water-logged from disuse of its thousands of pumps, the Calk foundations have universally softened and rotted, and the houses have settled and cracked, and many totter towards their doom. It is a vile stone in walls, as it "sweats" in Irish climate. Concrete is universal in new foundations; new walls are never built of this Calk stone, and as an "industry" it will never be heard of again.

Where is the chance of any practical development of Irish sandstone industries by people in their senses?—of, say, such folly as bringing from the interior of the country by expensive railway carriage hard, unworkable, uncertain stones at great cost, while at most places in reach of the seaboard excellent Dumfries stone, which stands the Irish climate well, can be laid down at 2s. per cubic foot?

There are exceptions, but they are very few, and should be distinguished as alone worth the while of practical people to catalogue them. It cannot be said that I have a preference personally for "foreign" stone. Some of the buildings quoted in the *Builder* are works of mine where I prevailed in forcing in the native stone. I believe I was the first person thirty years ago to suggest the trial of Irish limestone in an important front in a Dublin street. It would, of course, have developed in time without my patronage, but limestone is now *the* building-stone of Dublin—in my opinion the first of all building-stones in the British Islands. What it is capable of is witnessed in the last important cut stone building of Dublin, the Ulster Bank, on College-green. There is, if you will, a stone worth cataloguing and developing, but there is no fear of its being an industry wanting fostering care. It can take care of itself. Granites are good stones, but they are not neglected either, and require no sentiment wasted on them. The sandstone of Mount Charles quarries is worth attention. Sir Thomas Deane is to be credited with forcing this stone into notice. Mount Charles quarries are on the seaboard of Donegal. Magnificent specimens of stone are being now raised and shipped. This stone has, probably, a future before it, both in Ireland and other parts of the world.

But there remains a strange stone with a future, I think, which lies unknown and unquarried and utterly neglected, the Steatite of Donegal, not alluded to in the *Builder* notice. It was lately my experience to find this curious stone, in the course of a restoration, as being mainly used in the out-of-way ancient Cathedral of St. Adamnan, Raphoe. It is a thirteenth century building, and its cut stone remains as sharp as if it were cut yesterday or cast in bronze, and yet you may cut it with a carpenter's hand-saw or carve it with your pocket-knife. It is fire-proof, and called by the natives, Cam stones, and only used by them in modern times when they want to line a lime-kiln. Then they strip the top of a quarry and take out what is wanted and cover it up again. They cut it with a carpenter's axe. It is admirably adapted for lining furnaces, fire-grates, kitchen ranges, &c. You select a "seasoned" stone, cut it with your hand-saw to any size and shape, and "there you are." The dust from the saw, like French chalk, seems adapted to make an asbestos paint with silicate. Asbestos is found in layers in the quarry. Soft as it is, the stone can be polished, and thus resembles Lizard Serpentine.

I am glad to say I believe I have aroused enough spirit to have these quarrels re-opened to supply the store required for the restoration of the small cathedral. Its locality—but five miles from railway carriage—makes its development not hopeless. I believe, with the exceptions I have noted, the laments of the *Builder's* kindly reviewer over the long list of neglected Irish stones are thrown away.

A specimen of the limestone, which I do not think I unfairly vaunt, may be seen in a great monolithic cross at Lee Church, Blackheath.

THOMAS DREW, F.R.I.B.A.

*** Mr. Drew has apparently forgotten the subject of the article in our columns alluded to. We expressly wrote on the "Building *Sandstones* of Ireland," and not on Irish building-stones generally, as our correspondent's letter seems to imply. Moreover, we distinctly stated that the article treated not only of the sandstones at present raised, but of those of historic interest and of deposits as yet untouched. If we had alluded merely to the Irish sandstones at present quarried, the list given would have been considerably curtailed. We are perfectly aware of the fact that English and Scotch stone is largely used in Ireland, and have more than once written on the subject in these columns; indeed, the article under notice stated as much, and that is one of the reasons why we said that, with such an abundance of good stone at hand, it was remarkable that so much was imported. That the Irish sandstone industry has declined in importance is evident *inter alia* from the quarries at present abandoned. Mr. Drew's observations on Irish mines and minerals and steatite, like many of the other remarks in his letter, are irrelevant to the subject of the article.—ED.

SIR,—With reference to the very interesting article upon the above in the *Builder* of this date (perhaps the more interesting to those of us who are either Irishmen or directly connected or concerned with the Emerald Isle), I may add that, not only did the Scotch workmen, when building Muchross Abbey, Killarney, about forty years since, according to Mr. Kinahan, ignore the excellent stone of the neighbourhood, and import sandstone from Leicester, but I noticed when visiting the Nunnery at Kenmare (not far from Killarney) a few years since, the dressings of that establishment were constructed from Bath stone, notwithstanding the fact that they have, according to Mr. Kinahan, a very excellent stone close at hand. It was not as though there was any apparent benefit in thus importing stone from practically the heart of England to the far West of Ireland, but it was rather a case of going farther and faring worse, as the stone has already begun to decay considerably.

Their reason for doing this was, probably, the immediate saving in the cost of manipulation, but, as I should imagine they would have now to restore these decayed portions, instead of their submitting themselves to the first and only expense, the expenses will now be continuous.

I. of Portland, SEMI-HIBERNIAN.
March 26, 1892.

RIPON CEMETERY COMPETITION.

SIR,—The frame of mind in which promoters of competitons sit down to draw up their instructions to architects is difficult to realise. Apparently, if they have any common-sense to start with, they cast it all to the winds. The Corporation of the city of Ripon have, perhaps, "beaten the record" in this respect. They made up their minds to have a new cemetery,—of course they did not make up their minds themselves, the Government did that for them,—and, according to a wise law, all Burial Board works must be put up to public competition. I was induced by an advertisement in your paper to invest ten shillings in the purchase of their instructions for the same, and received for my money a plan of the ground and two sheets of (restrictions rather than) instructions, all printed on splendid paper, in very good style, but the purport of the documents failed to fulfil the augury of their presentment.

In the first place, the ground, about 4½ acres, is to be laid out, at a cost of not more than 200*l.*, which sum is to pay for all roads and footpaths, levelling, planting, and the superintendence of these works. For such a design, provided the Corporation obtain a tender to do the work for a sum not exceeding the specified amount, including the commission, they offer a premium of 10*l.* (the secondary premiums need not be considered); they do not bind themselves to accept any design, or to employ the designer; but, if the last-named event result, he is to prepare "all sketches for approval," to write "full and complete specifications," to make "working and detail drawings and estimates," to "superintend the works as landscape gardener," and give "all attendances on the Corporation." As 5 per cent. on 200*l.* comes to 10*l.*, and the premium "merges" into the commission, it is not clear that the "successful" man gets anything for doing the long list of work enumerated; apparently, he had better leave it alone severely, and yield himself to the delight of spending the premium only, or he will find that, by a wonderful bit of prestidigitation, somewhat resembling the three-card trick, the same sum covers both—in the right hand it is a premium; in the left hand it is a commission. The Corporation will employ an assessor (at what fee?), but they do not undertake to abide by his report: they put the pot on the fire, but they take care that it shall never boil. For this lovely 10*l.* they will not allow any one to send in more than "one alternative scheme"—that is, two designs in all! To deprive the designer of all hope of other remuneration, the Corporation announce that they will themselves make the drains and boundary walls—that is to say, the easy and remunerative work is to be given perhaps to a salaried official, or to some other favoured individual—anything, in short, rather than pay the designer for his work. But, they have one trait of munificence: any one may inspect the site, free of charge.

In the second place, they offer a premium of 20*l.* for designs for a chapel, a lodge, front boundary wall (length indefinite) and entrance gates, to cost collectively 1,670*l.* The usual commission on this stupendous amount must form in the eyes of the Corporation, a veritable Golconda—so rigorously is it guarded in the instructions. The stretchers are to be 30 in. by 20 in.,—no other size will do,—surely an unnecessary annoyance to would-be competitors if they have others in stock! No framed or glazed drawings; all drawings are to be black and white. (Why has it come to be the rule that *plans* may not be coloured in competitions? The reasons against colouring elevations and sections are cogent enough; but colour is necessary to help unpractised eyes to read plans.) You may send perspectives. All the restrictions and limitations described for the laying-out designs are repeated in this.

Is this the way that an enlightened community expects to get good service? Architects must either be too wealthy to need any payment for work done, or so poor that they must accept any dole that is offered. Where is the commonsense of the Corporation of Ripon? IPSISSIMA.

March 28, 1892.

JAPANESE ART.

SIR,—I think Mr. Piggott's discourse on Japanese art, referred to in your number of March 19, is, in one particular, not absolutely correct.

I have a Japanese cabinet in which the landscape on the door panels *is* obviously continued from one panel to the other, as if it had passed under the stiles.

The cabinet was brought from Japan for my father, in one of his own ships, about twenty-five years ago, and there is no doubt as to its being genuine Japanese. NORMAN WIGHT.

Santa Catalina, Boscombe Park, Bournemouth,
March 26, 1892.

VARNISH.

SIR,—In reply to the letter of "Inquirer" (page 231 *ante*), No reliable varnish for the purpose he requires is made. The best method is to get up the work in enamel—*i.e.*, varnish colour—and Blundell, Spence, & Co., Hull, I believe, supply the best ready-made article; but painters usually make their own enamels. L.

The Student's Column.

WARMING BUILDINGS BY HOT WATER.

XIV.

BOILERS.

WE have now practically come to an end of those subjects which exclusively apply to horticultural works. With boilers, the subject of this paper, and appliances which follow, no distinction can or need be made, as, even with the ordinary description of hot-water pipe that is so regularly seen in glass-houses, there is a large demand for identically the same article in heating buildings, particularly church work, warehouses, &c. If there is a distinction at all in boilers, then it is that the somewhat recent pattern upright cylindrical boiler is better suited than some of the other patterns, the saddle for instance, for withstanding the great strain or pressure that exists when an apparatus extends up several floors of a high building. It is generally understood that the saddle and similar shapes are likely to bulge if subjected to heavy pressure. This pressure, and its attendant features, will be fully referred to presently.

Within the scope of these articles it will be impossible to do more than treat the subject briefly, as will be understood. The first question is as to what constitutes a good boiler. To judge by the great number of patterns already introduced and the regular and frequent advent of new designs, it might be thought that the question had never been satisfactorily settled. Of course the primary object sought to be attained is to get the greatest possible effect from a given quantity of fuel, but in doing this there are other features that must not be wholly sacrificed. The heating surfaces of a boiler are divided into two kinds, viz., direct and indirect, which are really those surfaces which are directly against and opposite the fire, and those that are not, but are in flues. Direct heating surface is the most useful in about the proportion of three to one, that is to say, one foot of direct heating surface will heat the water as effectively as 3 ft. of flue surface. This is the rule usually laid down in books relating to this subject; but either it is intended only to apply to what we may term primary flues,—that is, the flues that receive the flame or

heated products immediately they leave the furnace,—or the figures were arrived at before the more complex forms of boilers were introduced. The flue-heating surfaces that receive the heat directly it leaves the fire-box doubtless bear the value just attributed to them; but second and third flues do not. Third flues are now quite common (as fig. 53),

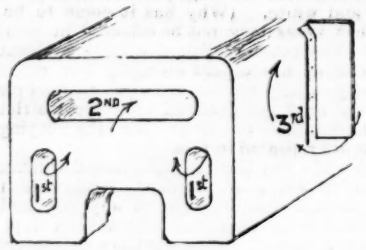


FIG 53

if the chimney draught is sufficient, and the works require a powerful boiler occupying small space. It would be somewhat exceptional for a boiler of this description to be used in private horticultural works, as the chimneys are usually very short, and the draught proportionately poor. This does not apply, however, to professional growers, who do not study whether a high chimney is unsightly or not, so long as they gain efficiency.

It is somewhat evident that the old pattern saddle-boiler, fig. 54, has fulfilled the require-

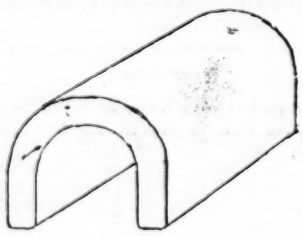


FIG. 54

ments that are at present considered necessary in a good boiler, so far as our knowledge of the subject extends at present, for, notwithstanding its age, it is still in great demand, and the majority of new patterns follow it in some way or another, as a glance at any maker's list will show.

The particular feature to be aimed at in a boiler is, as just stated, to benefit to the utmost extent by the direct heat from the glowing fuel. If the fire is in an incandescent state we have the effect of the glowing fuel lying against the boiler plates, and which we might say are absorbing the heat; and we have radiated heat acting against all those surfaces which are opposite to, or face the fire so to speak. This is best effected by making the boiler to envelope the fire, to encompass it, and a boiler made many years ago, much resembling a large inverted basin, was very effective in this way, although leaving much to be desired in other directions. The "terminal end" saddle boiler has the advantage referred to, without the disadvantages. It will be seen how much less effective a boiler can be made by unskilled stoking, by the fact that unless the fuel be kept bright at top, that is to say the fire not too heavily fed, we lose the effect of radiant heat, which cannot pass through the mass of black coal or coke that overlays the bright fuel, and a considerable lessening of results must ensue. Those forms of boilers that have top feeders are apt to induce careless stoking, if the ttendant is so inclined.

With the direct heating surfaces of boilers we may consider that those parts over the source of heat are more effective than those that come at the side of a source of heat, in the same way that we should expect a kettle to boil more quickly if placed over a fire than if placed at the side of the fire. This difference in the value of heating surfaces is balanced, however, by the fact that the top and most effective surface of the fuel is not always as bright and active as the rest, owing to each fresh charge deadening it for the time being.

With flue surfaces we have quite a different action so far as the application of heat is concerned, by the fact that we have neither radiant heat nor the contact of glowing fuel to rely upon, and the absence of these two sources of intense heat goes far to make the effectiveness of these surfaces much less. In addition to this, we seldom have top-flue surfaces, that is a flue bounded on the top by a heating surface (having, of course, water on the other side of it). We do not get this with the saddle or any, what we may call common, form of boiler, only when a flue is carried through the boiler itself, as fig. 55. From this it will be seen that

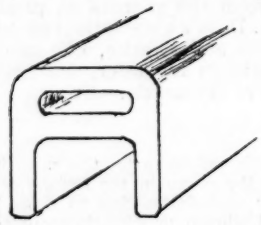


FIG 55.

flue surfaces are at a special disadvantage in not experiencing any of the direct results of the fire heat, and then only having side or vertical surfaces to be acted upon or surfaces which come *beneath* the source of heat, and which are, as a rule, practically useless. By surfaces beneath the source of heat is meant those like the top of a saddle-boiler, which generally has a flue-way made over it. A surface beneath flame or heated gases will always be found nearly, if not quite, valueless for practical purposes, and in addition to this it so readily gets a coat of dust or fine ash upon it, that, by its poor heat-conductive properties, quite completes its uselessness. In the majority of modern boilers, especially (strange to say) those that are held to be very powerful, the illustrations show the brickwork brought right tight on to the boiler-top, and this surface in question is made no use of whatever except to carry building material.

We now have to consider the actual value of heating surfaces. Of course, a hot-water engineer does not measure up and by calculation determine the size of the boiler by allowing so much heating surface to so much pipe. The usual plan is to study a boilermaker's list, where the dimensions of boilers are given, and their capability to deal with certain quantities of pipe under normal conditions plainly stated. Notwithstanding this, however, the question of heating-surface values ought to be treated, as no papers on these works are considered complete otherwise, and, further than this, the writer has to point out one or two things that are both important and interesting.

The first thing to be observed is that the values of boilers given in nearly all makers' lists are theoretical and not practical values, and if an engineer buys a boiler listed as being capable of heating, say, 500 ft. of pipe, and puts it to heat this quantity, or even 450 ft. of pipe, he will experience a disappointment, to say the least. It must not be thought that this is a deception on the makers' part, but they are a little to blame. It came about in this way:—Hood, who we have referred to, and whose rule the majority of boiler-makers have followed in compiling their lists, settled that one square foot of direct heating surface was capable of heating 50 ft. of 4-in. pipe, and for flue surface three times the area should be allowed (that is, 3 square feet of flue surface to 50 ft. of 4-in. pipe). By means of a rule like this, it was easy enough to arrive at the heating power of certain sized boilers. By measuring the surface that bounded the fire-box, and measuring the outer surface which would have heat conducted to it by flues, the quantity of pipe this boiler would heat was known in a few minutes.

This method of calculating the power of a boiler was, we may assume, only applicable to the saddle and older forms of boilers, and the method had a very desirable degree of certainty attending it. The fault, however, was that Hood, notwithstanding every care and allowance he could think of, put too high a value upon the heating surfaces in question, and although a boiler constructed upon these lines will actually heat the quantity of pipe given, it will only do so by forced firing, and great care in stoking and attention. For ordinary practical purposes it has been settled that the allowance is insufficient, and conducive to ill results.

This was not discovered until most of the boiler-makers had compiled their lists upon it, and the remedy adopted is to issue a little slip or notice in each catalogue, which generally runs as follows:—"The heating powers given in this price-list of boilers are based on the allowance in Hood's standard work upon hot-water heating,—viz., 50 ft. of 4-in. pipe for each foot of direct heating surface in boiler, and one-third this quantity for indirect or flue surface; but for ordinary actual work the heating powers in the list should be reduced 30 per cent.; thus a boiler estimated to heat 1,000 ft. should only be put to 700 ft. to do its work well or economically."

Of course, a notice like this is sufficient if brought conspicuously to the purchasers' or users' notice, but, as a rule, the notice is far from prominent, and unless the buyer is accustomed to the subject, very awkward mistakes may occur. This happens very readily with architects when specifying, and also with some building contractors who undertake this work but now and again. It would be far better if the boiler-makers rectified their lists; but, of course, all would have to act simultaneously, or some lists would, to the inexperienced buyer, appear to be much higher than others, to the detriment of those whose lists gave actual, and not theoretical, working quantities. The writer's custom, and which he has found effectual, is to deduct one-third from the quantities given on the general lists, if the boiler has good and proper attention. If, however, the boiler is in a residence and has attention of a rather irregular or unskilled character, then a little greater allowance is desirable, say, a 1,000 ft. boiler for 600 ft. of 4-in. pipe, or its equivalent in smaller pipe or other surfaces.

The general and theoretical list of saddle-boilers is as follows, but the makers so compile their lists that the 30 per cent. allowance is applicable to all patterns alike:—

Wrought welded plain saddle-boilers, with from 2-in. to 3-in. water-ways according to size:—

L. W. H.	Approximate heating power 4-in. pipe.
24×12×12	300 ft.
30×14×14	425 ,,
36×16×16	600 ,,
42×18×18	800 ,,
48×21×21	1,000 ,,
54×24×21	1,300 ,,
60×24×21	1,500 ,,

This list is abbreviated.

It should have been observed, in connexion with the last article on this subject, that in calculating the cubic contents of a lean-to house, the mean height is easily got at by measuring to a point half way from the eaves to the top, as fig. 52. The same plan can be

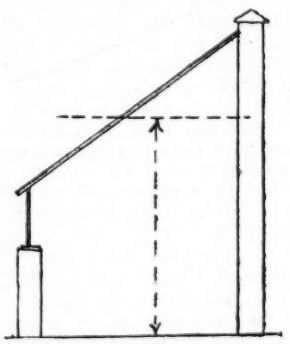


FIG. 52.

adopted with span-houses. The question of ventilation does not require our attention in glass-house work. Ventilation is not resorted to during winter nights when the air is at its coldest, and we can afford to lose a little heat at other times. Ventilation is not of the importance that it is in building works, the air not becoming so vitiated.

STORING CEMENT.—Professor Meidinger writes in the *Deutsches Baugewerks Blatt*:—"With a view to preserving the quality of cement, it is by no means a matter of indifference under what conditions it is stored. In a dry atmosphere it suffers no appreciable alteration, even after lying for several months. Damp air has, however, an injurious effect on it; the hardness of the mortar (beton, concrete, &c.) prepared therefrom is diminished. It was found that cement which was kept in a dry place showed a tensile strength of 17·8 kilogrammes (39·16 lbs.) and an elasticity of 201 kg. (442·2 lbs.); while for that stored in a damp situation the respective figures were reduced to 13·5 kg. (29·7 lbs.) and 143 kg. (314·6 lbs.). Cement should, therefore, not be kept in damp cellars, or in places contiguous to much water.

GENERAL BUILDING NEWS.

A Proposed Cattle Mart for Wigan. — The Streets Committee of the Wigan Corporation had before them on the 23rd ult. the details of a scheme for a proposed cattle mart for the town and district. The author of the scheme is Mr. Thomas Johnson, engineer, Wigan, who has had plans prepared by Messrs. Maxwell & Tuke, architects, Manchester. The site for the mart, which will be situated in Prescott-street, has a frontage of 140 yards, and covers an area of 15,000 yards. Rising from Prescott-street there will be buildings for the accommodation of sheep, cattle, and pigs. The principal entrance by road will be from Prescott-street, and at the gate there will be an hotel, which will occupy one side of the entrance passage, the other side being occupied by various other places. At the end of the passage there is a toll office, beyond which is the parade ground, coming direct from the railway wharf. Beyond the parade ground are more houses for the storage of animals, while nearer the railway are stores for meat, and two slaughter-houses. The slaughter-houses will be so constructed that 200 cattle and 600 sheep can be slaughtered a day, and by means of overhead rails the carcases can be sent from the stores to the railway trucks. There are also four sale rings, and provision is made for the conducting of a branch banking business on the spot. The accommodation for storing and keeping cattle provides for the housing of 800 cattle and 5,000 sheep and smaller animals. All the internal fittings are to be of iron, and the draining has, it is said, been carefully considered. The floors of the various buildings will be of concrete, and the inside walls will be lined with enamel bricks. The whole place will be lighted by a continuous line of skylights raised so as to provide ventilation. The mart will be connected with the Lancashire and Yorkshire Railway and the North-Western Railway. At the Lancashire and Yorkshire it is proposed to construct a siding and railway wharf.

Higher Grade School, Portsmouth. — The Higher Grade School for boys, Portsmouth, which has frontages of about 200 ft. and 100 ft. respectively in Victoria and Fawcett-roads, is rapidly approaching completion. The main building is constructed of brick, from the Rowland's Castle brick works, with Portland stone string courses, sills, &c. The east front, some 200 ft. from Fawcett-road, has a central tower, carrying a short truncated spire, which is surmounted by a stone turret. At the base of the tower is the entrance to the school, leading to a wide corridor or small central hall, and surrounded on three sides with class-rooms, while on the fourth side are the cloak-rooms and lavatory. On the upper floor is another corridor, at one end of which is the lecture-room. At the other end is the laboratory, and the remaining space on the floor is appropriated to another class-room, a preparation room, teachers' rooms, store, and other rooms. The heating arrangements have been carried out by hot water on the low-pressure system. The vitiated air from the building is carried through a shaft in the tower, into which the waste heat from the boiler-furnace induces a rapid up-draught. In the rear of the main block stands a range of buildings for workshops, and the caretaker's lodge. The erection of the school is being carried out by Mr. W. Learmouth, contractor, of Portsmouth, from plans prepared by Mr. C. W. Bevis, architect, of Southsea. Mr. Henry Lawrence is clerk of works. The hot-water and ventilating arrangements have been left to Messrs. Haden & Sons, the wood-block flooring has been supplied by Messrs. Duffy & Co., London, and the carving has been executed by Mr. S. Horsman, London.

Church of St. Margaret's, Harrow-green, Leytonstone.—On the 19th ult., the Marchioness of Salisbury laid the foundation-stone of the new Church of St. Margaret's, Harrow-green, Leytonstone. The site upon which the church is being erected is situated at the corner of the Woodhouse and Cobbolds-roads, near Leytonstone High-road. The designs are by Messrs. J. T. Newman & Jacques, of London, and the work has been entrusted to Mr. S. J. Scott, builder, of Walthamstow. The church will be of the thirteenth-century style, and will be constructed of brick. Seating accommodation will be provided for 821, exclusive of the choir.

Club Buildings, Newmarket.—On the 18th ult. the foundation-stone of the Newmarket Workingmen's Conservative Club was laid by Lord Chelsea. The site of the club is at the corner of Exeter-road. It will be built of red bricks, with Bath stone facings. There will be an entrance hall, an assembly-room, 60 ft. by 29 ft., a billiard-room, card and committee rooms, bar, lavatory, &c., on the ground floor, and rooms for the caretaker on the first floor. The roof will be covered with Broseley tiles. The estimated cost of the building is 1,010*l*. The architects are Messrs. Holland & Son, and the builders Messrs. Hunt & Blyth, of Newmarket.

New Church, Greenock.—On the 24th ult., the new Congregational Church in St. Lawrence-street, Greenock, was opened. The new buildings measure 120 ft. along St. Lawrence-street, the church occupying the east or higher portion of the ground, and the hall buildings the west end. There is sitting accommodation in the church for 550. The pulpit is an open platform, with a lower platform in front for the choir; and behind is a recess for an organ. The church longitudinally is divided into five bays, three of them having single lancet windows. The gable to the street is flanked by a turret spire 67 ft. in height. The hall buildings comprise a Sabbath-school hall, with two class-rooms, a vestry, and deacons' room; and there is a kitchen under the basement at the west end of the church. English Gothic is the style of architecture. The cost is about 2,000*l*. Mr. D. B. Stewart, Greenock, was architect.

Restoration of Parish Church, Winterborne Stickland, Dorset.—The parish church at Winterborne Stickland, Dorset, was opened on the 29th ult. after restoration. To the tower a new roof and vane have been provided, and the walls, as well as those of the main structure, have been repointed and defective stones replaced. On measuring a portion of the chancel roof for repair, portions of an old oak waggon-headed roof were discovered. This has been carefully restored and made good. Portions of an old oak carved screen were also found behind the wooden lining of the doorway, between the chancel and the chapel. This also has been restored, and left in the position in which it was discovered. A discovery was also made in the porch of a rude sculpture of the Holy Rood. The sculpture was found bedded with the faced side hidden in the east wall of the porch. The walls, which were probably rebuilt in 1716, says the *Dorset County Chronicle*, have all been underpinned with concrete, as the foundations were found to be very defective. The roof of the porch has been taken off and repaired where necessary. A new heating chamber has been built at the north side of the tower for heating the church with hot air, the apparatus being supplied by Messrs. Haden & Sons, of Trowbridge. The "Skinner" mausoleum has also had its roof repaired. In the interior, the old gallery and organ have been removed; the tower has been thrown open and the west window is plainly seen; the arch from the nave to the tower has been cleaned and repaired; and the old high-backed pews have been replaced by modern pitch-pine seats. The floor within the Communion rails is of tiles of various colours, laid in pattern. The entrance to the mausoleum is ornamented with oak carving. The floor of the body of the church is formed of wood blocks laid on cement. The windows are glazed with cathedral glass with a coloured design in the centre of each light. The walls are coloured grey. Mr. W. J. Fletcher, of Wimborne, was the architect; Mr. George, of Milton Abbas, the contractor; Mr. Gillingham executed the plumbing, glazing, and painting; and Messrs. Meyrick & Son, of Glastonbury, undertook the renovation of the old oak roof.

SANITARY AND ENGINEERING NEWS.

Loughborough Sewage Disposal. — The Borough Surveyor of Loughborough, Mr. A. W. Cross, has prepared a scheme for the sewage disposal of Loughborough. The population of Loughborough is about 18,000. A provisional agreement has been signed for the purchase of 33 acres of land. It is proposed to pump the sewage and treat it by chemical precipitation in tanks, followed by filtration through land. There will be three precipitation tanks, of a total capacity of 600,000 gallons. There will be a storage tank for night-sewage, and buildings for pumping and mixing-machinery. The dry ash refuse from the town will be carted to the works and utilised in "forced draught" destructors for the production of steam for pumping the sewage. About half the land will be laid out with carriers and under-drainage for land filtration. The sewage will be brought to the site through 21-in. and 24-in. iron intercepting outfalls, the sewers being laid about 8 ft. below subsoil water-level. The Town Council have decided to borrow 20,000*l*. The Council have engaged Mr. W. H. Radford, C.E., of Nottingham, to act as Consulting Engineer throughout the preparation of the plans and the execution of the work, and various amendments and alterations suggested by him have been incorporated in the scheme.

Drainage and Sewage Works, Stone. — The Stone (Staffordshire) Local Board a few months ago invited engineers to submit designs for the drainage of the town and for the disposal of the sewage, and a premium of 100 guineas was offered for the most suitable. Twelve schemes were submitted. A special committee, having carefully considered these, have now reported in favour of the scheme prepared by Mr. Theo. S. McCallum, C.E., of Manchester; and at a meeting of the Board on March 24 the committee's recommendation was adopted. Every street in the town will require a new sewer. About nine-tenths of the sewage will reach the purification works by gravitation; the remainder will have to be pumped. The sewage will be purified by the "International" process—precipitation by "Ferozone" and filtration through "Polarite." The sludge will be pressed. A large proportion of the sewage of Stone consists of brewery refuse.

FOREIGN AND COLONIAL.

France.—A bust of Dr. Damaschino, the work of Alfred Bouche, sculptor, has just been erected in the Hall of the Faculty of Medicine, Paris.——The sculptor Michel Malherbe has been commissioned to execute a monument to the poet Ephraim Mikhaël, which is to be paid for by a subscription committee.——The Department of Fine Arts has just presented to the Faculty of Literature in Paris (for the decoration of one of their amphitheatres) a Gobelins tapestry representing the deification of Homer. It has been executed about fifteen years after a copy of Balze and Dumas, which forms a ceiling in one of the halls in the Louvre.——The Fécamp Museum has just received an addition in the shape of a very fine drawing by Ulysse Butin, one of a collection belonging to Louis Lelois.——June 2 is the day fixed for the inauguration of the Monument at Agen to the memory of the leaders of Lot and Garonne.——The French Alpine Club is going to hold an exhibition of pictures at Grenoble, which is to consist entirely of Alpine scenery. This exhibition will last from July 16 till August 31.——The statue of Admiral Bruat at Colmar has been defaced by some unknown persons. The Municipality has offered a reward for the discovery of the authors of this act of vandalism.——The new Lycée of Argenteuil at Mantes is to be opened on May 29 instead of April 25.——The death of M. John Flornoy, artist, is announced from Nantes. In the recent exhibition in that town he had some fine landscapes.——We have also to record the death of M. Andru, who had a very fine collection of works of arts at Tours, and one which was much appreciated by connoisseurs.

MISCELLANEOUS.

Exhibition of Works in Wood.—It is announced that the Worshipful Company of Carpenters and the Worshipful Company of Joiners will hold an exhibition of works in wood and wood-carving in May next. All particulars as to prizes, &c., may be obtained at Carpenters Hall, London Wall, where the Exhibition will be held.

The New French Embassy in St. Petersburg.—According to the *Grashdanin*, the new French ambassadorial hotel is now ready. It is a palace situated on the Neva. On the ground floor are the official rooms of the Ambassador. The walls are hung with real Gobelins tapestries, and the entire furniture is of historic and artistic value. The colours used throughout the building are purple and olive-green. On the first-floor are situated the fête rooms, and in the grand reception-room, the colour prevailing being red, the walls are hung throughout their entire length with costly Gobelins tapestries. Next to this room is situated a smaller chamber, in olive-green, ornamented with valuable paintings and huge mirrors, and next to this again is a card-room, in red. On the same floor are situated the grand banqueting-hall and a smaller dining-room for the *personnel* of the Embassy. In the former is mounted a statuary group in marble, representing Lully, in the dress of a kitchen boy, playing the violin before the Duc de Montpensier. Between the two latter chambers is situated the concert-hall,—a chamber with rich stucco gold ornamentations. From this hall huge portals open upon a balcony, affording a fine view of the Neva. The French hotel is one of the finest buildings in St. Petersburg. The Gobelins tapestries therein alone are valued at several million francs.

An Artificial Stone.—The *Moniteur de la Céramique et de la Verrerie* gives a formula for an artificial stone:—Forty parts of granite, fifteen parts of flint, and five parts of feldspar are mixed as a fine powder with four parts of plastic clay and slightly moistened. The compound is then powerfully compressed, dried, and burnt at a high temperature in a porcelain-oven. The stone thus obtained is stated to be capable of withstanding great pressure, and is impervious to water.

The English Iron Trade.—Depression still characterises the English iron trade. Business in both crude and manufactured iron is extremely limited; few changes in quotations, however, are recorded. For tin-plates the demand continues quiet, and in the steel trade rail mills and works engaged in manufacturing shipbuiding material are those best employed, although only to a moderate extent. In the shipbuilding and engineering trades a quiet tone is manifested. The coal trade is rather inactive.—*Iron*.

The Railways of the World.—According to the *Eisenbahn Zeitung*, the railways of Europe increased from 214,328 kilomètres in 1888, to 220,261 kilomètres in 1889, or by 12·6 per cent. The largest increase, 119·2 per cent., is shown by Greece, Roumania coming next with 51·2 per cent. The increase in Great Britain and Ireland was 4·0 per cent. In the United States the increase was 52,179 kilomètres, or 25·1 per cent. In British India the increase was 6,180 kilomètres, or 32·0 per cent.; in the Cape Colony, 80 kilomètres, or 2·9 per cent.; and in Natal 190 kilomètres, 102·1 per cent. In Australia the increase was 4,975 kilomètres, o 38·3 per cent. The increase for the entire world was 108,600 kilomètres, or 22·3 per cent.

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premium.	Designs to be delivered.
*Improving Open Space called "The Maes"	Criccieth Loc. Bd.	6l. 6s.	May 27
School Buildings	St. George (Bristol) Sch. Bd.....	Not stated.....	No date.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Road Works	Dynas Powis High. Bd.	E. R. Lewis	April 5
Granite Road-metal.....	Thrapston High. Bd...	Geo. Siddons	do.
Pipe Sewers, Manholes, Pumping Station, &c. Kegworth, Derby.....	Shardlow R.S.A.....	W. H. Radford	April 6
House, Caerphilly	.....	Phillips & Holdgate ..	do.
*Iron and Glass Porch	Hackney Union	*Official*	do.
*Alteration, Goods Shed, Penygraig	Gt. Western Ry.....	do.	April 7
Service Reservoir, Panteg.....	Pontypool Gas and Water Co.	do. *	do.
*Wooden Doors to Lifts at Infirmary.....	St. Saviour's Union, Surrey	do.	do.
*Repairs at St. George's Workhouse	do.	Jarvis & Son.....	do.
Three Houses, Upper Range, Northowram, Halifax	.....	G. Buckley & Son	do.
Alterations to Premises, Westgate-road, Newcastle-on-Tyne	J. W. Parker	Philip Spicer	do.
School Premises, Aberfon	Merthyr Tydfil Sch. Bd.	J. Williams	do.
Forty-two Houses, Ystrad Rhondda, S. Wales	J. C hen	.....	April 8
Alterations to Gray's Hospital, Elgin, N.B.	.....	A. & W. Reid	do.
*Purchase and Clearing away Building Materials	Sch. Bd. for London ..	*Official*	do.
School, Ripley, Derby.....	.....	R. Argile	April 9
Steam Laundry Block, Sedgfield Asylum	Durham County Lunatic Asy. Com.	W. Crozier.....	do.
Additions, &c. Altyre House, near Forres, N.B.	.....	A. & W. Reid	do.
Distillery, Warehouses, &c. Parkmore, near Dufftown, N.B.	....	Gordon & McBey.....	do.
130 Houses, Aberdare Junction	Ynysmeurig Club	A. O. Evans	do.
Additions, &c. Crow Beacon, Linney Head, Milford Haven.....	Trinity House Corp...	*Official*	April 11
*Pit Sand	Com. of H. M. Works	do.	do.
*New Sewers.....	St. Giles Bd. of Works	do.	do.
Work, Llandaff Cathedral.....	Llandaff Highway Bd.	G. Wallace.....	do.
Road Works	do.	J. Holden	do.
Street Making, and Eighteen Houses, Consett, Durham.....	Indus. and Prov. Soc. Lim.	do.	do.
*Sewerage Works	Hambledon R.S.A.	W. S. Snell	do.
*New Room at Girls' School	Walthamstow Sch. Bd.	W. N. Lailey	April 12
		W. A. Longmore.... .	do.

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor or Engineer.	Tenders to be delivered.
*Paving Works	West Ham Council ..	Lewis Angell	April 12
*Making-up Road	do.	do.	do.
*Circular Iron Urinal	do.	do.	do.
*New Market, Arcades, and Shops	Borough of Halifax ..	Leeming & Leeming ..	do.
*Kerbing and Channelling	Hackney Bd. of Wks..	*Official*	April 13
*Gullys, Grates, Manhole Covers, &c.....	do.	do.	do.
*Asphalte Works	do	do.	do.
*Sewerage Works	Petersfield R.S.A.	W. N. Lailey	do.
*Making-up and Paving Roads	Fulham Vestry	W. Sykes	do.
*Repair of Laundry Drying Horses.....	Lambeth Guardians ..	*Official*	do.
*Blue Guernsey Granite Spalls.....	West Ham Union	do.	do.
Widening Bridge, &c. Chesford, Kenilworth	Warwickshire C. C. ..	do.	April 16
Large Hall and Two Shops, Woodfield-street, Morriston, S. Wales.....	Morriston Public Hall Co. Lim.	.....	do.
*Oak Fencing	Harrow Loc. Bd.....	Cowell & Gray.....	April 19
Cooperage, Blackfriars-road, Elgin, N.B.	G. Gorrod	.....	April 21
*Sewage Works	Horsham U.S.A.....	B. Latham	do.
*Drainage of Christchurch Workhouse	St. Saviour's Union, Surrey	Jarvis & Son.....	do.
Cast-iron Water Mains, &c.	Lower Brixham Local Board	Ed. Ellis	April 23
*Tarpaving Works.....	LondonCountyCouncil	*Official*	April 26
*Completion of New Workhouse	St. Pancras Guardians	A. & C. Harston.....	April 27
*Building, &c. Gymnasium.....	LondonCountyCouncil	*Official*	April 29
Dredging, Newport, Mon.....	Harbour Commrs.....	L. F. Vernon Harcourt	April 30
*Electric Lighting	Chiswick Loc. Bd.	A. Ramsden.....	May 4
*R. C. Church, Shelfield, near Walsall ...	The Building Com...	S. Loxton	No date
*Alterations, Sea Lion Hotel, Hanley	The Proprietors	do.	do.
*Erection of New Premises, &c. Walsall ..	do.	do.	do.
*Erection of Nine Villas, Walsall	do.	do.	do.
*Works at St. Paul's Church Inst. Burton-on-Trent	.....	R. Churchill	do.
*Erection of Church, Dulwich	.....	Oliver & Leeson	do.
*Additions, &c. Holmeshurst, Sussex.....	.....	R. J. & J. Goodacre ..	do.
*Alterations, &c. Torbay Hospital	The Commrs.	Habershon & Fawckner	do.
Alterations to Premises, Shields-road, Newcastle-on-Tyne	Wm. Thompson	J. W. Thompson.....	do.
Shop and Dwelling-house, Haydock, Wigan	Mr. Pilling.....	.....	do.
Enlargement of Schools, Goose Green, Wigan	.....	Heaton & Ralph	do.
Mill, Westbury-street, Elland.....	W. Iredale & Co.....	.....	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Draughtsman, Hydrographical Dept. of Admiralty	Civil Service Commrs.	.....	April 6
*Clerk of the Works	Northallerton L. B. ..	2l. 2s. per week	April 7
*Superintendent (Cleansing & Dusting, &c.)	Commrs. of Sewers ..	400l.....	April 19

Those marked with an Asterisk (*) are advertised in this Number. *Competition, p.* iv. *Contracts, pp.* iv., vi., & viii. *Public Appointments, pp.* viii. & xx.

A WARNING TO BUILDERS.—At the North London Police-court, on March 25, Messrs. Parsons & Co., contractors, were summoned for executing work at the Lead Works, Southgate-road, Islington, without having previously given notice to the District Surveyor. Mr. Henry Lovegrove, District Surveyor of South Islington, proved the case, and Mr. Haden Corser fined the defendants 20s., with 12s. costs.

WALLS OF INSUFFICIENT THICKNESS. — Mr. Pereira, a builder, was summoned by Mr. C. Fowler, District Surveyor of Shoreditch, for erecting a building with walls of a thickness less than as prescribed by the Building Act. Mr. H. Lovegrove, Deputy District Surveyor, proved the case, and stated that the defendant had been repeatedly warned. Mr. Mead ordered the work to be amended, and the costs, 22s., to be paid.

PORTLAND CEMENT TESTS.—Mr. V. de Michele, the inventor of the well-known testing machine which goes under his name, sends us his suggestion for a specification for cement under his test, which he considers may be relied on to ensure good sound Portland cement. The conditions are as follows:—"Pats $\frac{1}{8}$-in. thick in water, absolutely sound at seven days. Tensile strength, 400 lbs. per square inch at seven days. Fineness, 10 per cent, residue on a 50 sieve. The pats to be gauged on glass, immersed in water immediately, and left there for the whole period. One pat to each three bricks. The test bricks to be gauged by a skilled man, with any quantity of water, in any way he likes. The average of three to be taken, which shall represent about 100 tons or less. The strain to be applied as quickly as possible. The sieve to have 2,500 holes per square inch, and to be of wire $\frac{1}{100}$th of an inch in diameter. Shaking to be continued until nothing ground in the mill passes."

REMOVAL.—Messrs. Prickett & Ellis inform us that they have removed from No. 60, Chancery-lane, to No. 57, the adjoining building.

"FIRE AND WATER."—This little periodical for April gives as a supplement a sheet of illustrations, to a small scale, of some new English fire-brigade stations. It also contains much interesting information relating to fire extinction, including a description of a system of fire-recording adopted by the Chief of the Chicago Fire Brigade. Each record of a fire consists of a report, accompanied by a plan or map, showing adjacent properties, fire-plugs used, positions taken up by the engines, disposition of the lines of hose, direction of the jets brought to bear on the fire, and other details.

THE WATER TUNNEL UNDER THE MERSEY.—A comparatively small but nevertheless essential part of the great scheme for bringing water from the Vyrnwy Valley to Liverpool,—it might be more fitly described as the last link in the gigantic chain,—has been brought to a successful termination. At eight o'clock on the morning of the 22nd ult., the long tunnel bore under the Mersey at Fidler's Ferry was completed.

STAINED GLASS WINDOW, ARBROATH.—A Munich stained glass window has just been erected in the St. Mary's Episcopal Church, Arbroath, N.B. The scene represented is the Angel at the Tomb in the centre light, and the figures of Mary Magdalen, Mary, the mother of James, and Salome, in the two side lights. The window was designed and executed by Messrs. Mayer & Co., of Munich and London.

MEETINGS.

SATURDAY, APRIL 2.

Architectural Association.—Visits to (1) the Newington Weights and Measures Offices, Union-road, Blackman-street, S.E., by permission of Mr. Thomas Blashill-3 p.m. (2) the Royal Ophthalmic Hospital, St. George's-circus, S.E., by permission of Mr. Keith D. Young. 4 p.m.

Institution of Civil Engineers.—Annual Dinner of the members, in the Town Hall, St. Martin's-in-the-Fields, Charing Cross-road. 6.30 p.m.

Sanitary Inspectors' Association —Mr. J. Davenport on "The Sanitary Inspector: His High Calling." 6 p.m.

MONDAY, APRIL 4.

Royal Institute of British Architects.—(1) Paper by Signor Luca Beltrami on "The Construction of the Central Pillars of Milan Cathedral." (2) Mr. J. Starkie Gardner on "Wrought-Ironwork: the Renaissance Period." 8 p.m.

Society of Arts (Cantor Lectures).—Mr. Bennett H. Brough on "Mine Surveying." II. 8 p.m.

Society of Engineers.—(1) Adjourned discussion on Mr. S. Sellon's paper on "Electrical Traction and its Financial Aspect." (2) Mr. Reginald Bolton on "The Application of Electricity to Hoisting Machinery." 7.30 p.m.

Liverpool Architectural Society.—Paper by Mr. T. Mellard Reade.

TUESDAY, APRIL 5.

Institution of Civil Engineers. — Mr. H. Alfred Roechling on "The Sewage-Farms of Berlin." 8 p.m.

Society of Arts (Foreign and Colonial Section).—8 p.m.

Glasgow Architectural Association.—Mr. C. E. Whitelaw on "The Parish Churches of Scotland." 8 p.m.

WEDNESDAY, APRIL 6.

Royal Archæological Institute.—(1) Mr. A. L. Lewis on "The Stone Circles of Britain." (2) Mr. J. L. André on "Widows and Vowesses." 4 p.m.

St. Paul's Ecclesiological Society.—Mr. F. J. Beckley on "The Round Towers and Romanesque of Ireland." 7.30 p.m.

Society of Arts.—Mr. R. McCormick on "The Future Trade Relations of Great Britain and the United States." 8 p.m.

Builders' Foremen and Clerks of Works' Institution.—8.30 p.m.

THURSDAY, APRIL 7.

Society of Arts (Indian Section).—4.30 p.m.

Society for the Encouragement of the Fine Arts.—8 p.m.

Society of Antiquaries.—8.30 p.m.

Institution of Electrical Engineers.—Discussion of Mr. A. Reckenzaun's paper on "Electric Tramways and the Cost of Electric Traction." 8 p.m.

Royal Institution.—Dr. B. A. Whitelegge on "Epidemic Waves." II. 3 p.m.

Edinburgh Architectural Association. — Mr. A. H. Millar on "The Hie Gait and Sautmercat of Glasgow in the Olden Time." 8 p.m.

FRIDAY, APRIL 8

Institution of Civil Engineers (Students' Meeting).—Mr. R. J. Durley on "Some Forms of Petroleum Engines." 7.30 p.m.

Royal Institution. — Professor W. E. Ayrton on Electric Meters, Motors, and Money Matters." 9 p.m.

Bradford Historical and Antiquarian Society.—Mr. W. Claridge on "Bradford Grammar School." 8 p.m.

Dundee Institute of Architecture.—Mr. W. D. M'Kay on "The Art of the Low Countries." 8 p.m.

SATURDAY, APRIL 9.

Edinburgh Architectural Association.—Visit to Yester House and Old Castle, and Nunraw.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

18,755.—SAWS: *W. Junge.*—This relates to an invention to provide saws with teeth presenting sharp knife-edges for cutting the material, and having clearance spaces for the waste, applicable to saws having their teeth made in one piece with the blade, and also to those provided with inserted or exchangeable teeth. The inventor provides the teeth of saws alternately on their right and left hand side at or near the top with a narrow recess or groove of any suitable depth or shape, from the front to the rear, in such a manner that extremely sharp knife-edges for cutting the two sides of the kerf are produced. Along the top of the teeth is preferably formed a thin ridge constituting a sharp knife-edge for cutting the base of the kerf. In this improved saw the dust or waste produced by one tooth passes through the aforesaid groove in the same into the throat space in front of the following tooth, by which it is removed from the kerf. The inventor claims that by his improvements very smooth surfaces and clean edges are produced, so that little or no finishing is required, and a considerable saving of material, labour, and motive power effected.

5,520.—BRICKS: *S. G. Phillips.*—This refers to an invention for drying bricks after they have been moulded from the wet clay, preparatory to burning. The material is traversed slowly through a long building carried in open-work tiers on cars moved either continuously or intermittently, and is subjected to lateral currents of air artificially warmed. Heat is economised, and uniform and just sufficiently rapid drying induced by causing the warm air, loaded with moisture, to impart its heat as it goes out to the incoming cold bricks, and causing the warm bricks as they go out to impart their heat to the incoming cold air.

6,545.—VENTILATORS: *J. W. M. Peyton and O. Y. Rhodes.*—This specification relates to a new form of apparatus specially designed for ventilating or removing foul air from rooms, railway-carriages, drains, soil-pipes, and the like. The apparatus consists of a vertical pipe or tube having around its periphery a series of openings carried up vertically in the form of small tubes, and terminating within the central tube some distance from its top. These openings are larger at the inlet than the outlet, so that as air enters them and passes up through the contracted parts in small tubes it will be compressed, and thus acquire velocity in ascending the several tubes, so that on the air entering the central tube it will create an up-draught therein, the suction of which draws the air upward from the room or other place to which it is applied. In some cases a revolving cap or cowl may also be used advantageously.

6,839.—GAS-FITTINGS: *J. Fairbank.*—This relates to an invention to prevent waste of gas while alight, and the escape of gas while not burning. The inventor constructs a spring of brass, steel, or other suitable material, having notches, stops, or grooves at one end formed by stamping up the metal into suitable shapes, and a clipping apparatus at the other end for securing it to the gas-pipe. This spring presses upon the tap and holds it firmly in the position in which it is placed, and is claimed to answer in all ways the purposes indicated above.

19,515.—COWLS: *W. E. T. Bennett.*—This refers to an invention designed to prevent gusts of wind blowing down chimneys, and so causing them to smoke, and to

utilise such down-blasts to improve the up-draught in the chimney. To the top of the chimney-pot is attached a truncated cone, to the base of which is secured an upwardly projecting inclined flange. In the gutter thus formed are punched a few holes for the escape of any rain that may collect. Above the chimney, and supported by stays, is fixed a hollow conical cover, the diameter of the base being about the same as that of the base of the truncated cone. By this arrangement the cover prevents the down-blasts from entering the chimney, whilst the inclined flange catches a part of the downward current, and deflects it on to the side of the truncated cone, which, in turn, deflects it on to the opposite side of the hollow cover, whence the current passes away by the annular open space, increasing as it goes the up-draught in the chimney.

21,997.—FIRE-RESISTING BRICKS, &c.: *J. K. Thompson.*—This invention consists of a special mixture of fire-resisting material, composed of fireclay, plumbago, graphite, and cement, in the proportions set out in the specification. This material may be made into bricks, under hydraulic or other pressure, and baked in the usual manner, or, diluted, it may be applied in a liquid state as a wash or coating for fireplaces, fireboxes, furnaces, ovens, or kilns.

NEW APPLICATIONS FOR LETTERS PATENT.

March 14.—4 969 H. Thorpe, Gas-brackets.—5,010, J. Grundy, Ventilator and Chimney-cowl.

March 15.—5,053, A. Ransome, Band-sawing Machines.—5,054, A. Ransome, Band-sawing Machines.—5,063, T. Robinson, Window-fastenings.—5,067, H. Angles, Imitation Faience Tiles, &c.—5,094, R. Crompton, Linings or Coverings for Walls, Ceilings, &c.

March 16.—5,147, C. Harwood, Combined Non-corrosive and Water-waste Preventing Cistern for Water-closets.—5,156, P. Field, Sash-fastening for Windows and doors.—5,189, J. Johnstone, Screw-drivers.—5,221, W. and R. Smith, Chimney-pot, Cowl, or Ventilator.

March 17.—5,254, A. Lamplough, Sash-fasteners.—5,291, W. Morton, Ornamental Materials for Decorating Walls, &c.—5,292, W. Morton, Construction of Walls, Partitions, and Ceilings.

March 18.—5,346, M. Martin, Rule and Plumb level.—5,353, E. Stoeffler and F. Alexandre, Smoothing-iron with Removable Handle.—5,365, Munro's Electrical Manufacturing Company, Ltd., and J. McFarlane, Joints for Electric-light Fittings.—5,390, J. Hamblet, Paving Bricks.—5,401, L. Jenkins, Paint and other Brushes.

March 19.—5,437, C. Wallworth, Wooden Flooring-blocks.—5,446, T. Barrow, Stoves, 5,471, E. Louap, Stoves.

PROVISIONAL SPECIFICATIONS ACCEPTED.

854, E. Cooper and E. Turrall, Door-springs and Checks.—2,232, G. Haskins, Spring Hinges.—2,325, W. Pitt, Folding Gates.—2,364, G. Thompson, Nails.—2,872, H. Alexander, Chimney-tops to prevent Down-draughts, &c.—2,894, J. Golding, Metal-covered Truss-work for carrying Concrete Floors and Ceilings.—3,286, J. Caldecourt, Sockets or Joints of Rain-water pipes.—3,448, E. Parr, Screws.—3,465, D. Andrew, Drain, Sewer, and like Pipes.—3,466 D. Andrew, Laying Sewer-drain, &c., also for testing the same.—3,845, J. Buchanan, Brick-making Machinery or Apparatus.—4,048, J. Ottaway, Window-sashes and Frames.—4,062, C. and C. Kite, Ventilators.—4,149, W. Charlesworth, Slurry Drying Structures, used in making Cement.—4,424, M. Brophy, Door-locks or Latches.—4,426, M. Brophy, Door-knobs and Spindles.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

8,234, E. Davis and T. Baldwin, Joints for Coupling Pipes and other articles.—8,503, A. Lamplough, Sash-fasteners.—20,743, J. Abell, Paving.—21,669, H. Woodcock, Flushing Cisterns for Water-closets.—536, J. Robson, Burglar-proof Sash-fastener.—1,092, J. Brown, Chimney-pots and Tall Boys, Cowls, &c.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

MARCH 21.—By *R. A. Notley*: 10 and 12, Tooley-st., Southwark, f., area 2,550 ft., 6,050*l.* By *Wagstaff & Warman*: 17 and 19, Northampton-st., Islington, u.t. 26 yrs., g.r. 10*l.* 10s., 380*l.*; 28 and 30, Northampton-st., u.t. 26 yrs., g.r. 10*l.*, r. 68*l.*, 435*l.*; 13, Alwyne-villas, Canonbury, u.t. 26 yrs., g.r. 6*l.*, r. 36*l.*, 250*l.*—By *Jenkins & Sons*: 80, Blackheath-rd., Greenwich, f., 560*l.*—By *Harman Bros.*: 12, Manor-rd., Stoke Newington, f., 1,270*l.*; 18, St. James's-rd., Hackney, u.t. 66 yrs., g.r. 3*l.* 8s., r. 35*l.*, 360*l.*; i.g.r. of 20*l.*, Bonner-rd., u.t. 66 yrs., g.r. 12*l.*, 135*l.*; 27, Northfield-rd., Stamford-hill, u.t. 94 yrs., g.r. 9*l.*, 580*l.*; 97, Lordship-rd., u.t. 82 yrs., g.r. 12*l.*, 650*l.*; 68, Osbaldeston-rd., u.t. 86 yrs., g.r. 8*l.*, r. 48*l.*, 485*l.*

MARCH 22.—By *C. W. Davies*: 32, Clifton-st., Finsbury, u.t. 15 yrs., g.r. 7*l.* 8s., r. 65*l.*, 305*l.*; 40, Turnpike-lane, Hornsey, u.t. 88 yrs., g.r. 7*l.*, 305*l.*—By *J. McLachlan & Sons*: "Prescott Lodge," Clapham, and a plot of land, u.t. 49 yrs., g.r. 31*l.* 10s., 950*l.*—By *Debenham, Tewson, & Co.*: i.g.r. of 203*l.*, Burgess, Ashlin, and Crownfield roads, Stratford, u.t. 54 yrs., g.r. 80*l.*, 1,880*l.*; 14, 15, and 16, Taylor's-pl., Stepney, u.t. 31 yrs., g.r. 8*l.*, 205*l.*; 26, Little Marylebone-st., Marylebone, u.t. 10 yrs., g.r. 14*l.*, 365*l.*—By *Dowsett & Co*: 2 and 13, Elm-mews, Hyde-pk., u.t. 67 yrs., g.r. 16*l.*, 325*l.*; 5 and 6, Elm-mews, u.t. 67 yrs., g.r. 13*l.*, r. 61*l.* 10s., 400*l.*; 119, Warwick-rd., Kensington, u.t. 83 yrs., g.r. 16*l.*, r. 100*l.*, 1,270*l.*; 1 to 29 (odd), Agnes-st., Silvertown, u.t. 83 yrs., g.r. 45*l.*, r. 273*l.*, 1,370*l.*; 2 to 22 (even), Agnes-st., u.t. 83 yrs., g.r. 33*l.*, r. 200*l.* 4s., 1,000*l.*—By *Foster & Cranfield*: "Ridge House," The Ridgeway, Enfield, u.t. 86 yrs., g.r. 15*l.* 10s., 600*l.*; 30, Lordship-pk., Stoke Newington, u.t. 81 yrs., g.r. 10*l.* 10s., 755*l.*—By *Bean, Burnett, & Co*: 18 and 20, East Dulwich-grove, Dulwich u.t. 91 yrs., g.r. 13*l.*, r. 68*l.*, 450*l.*

MARCH 23.—By *Alfred Watson*: 45 and 47, Eleanor-rd., Hackney, u.t. 52 yrs., g.r. 10*l.*, r. 66*l.*, 620*l.*; 214 and 216, Richmond-rd., u.t. 53 yrs., g.r. 13*l.* 10s., r. 80*l.* 650*l.*—By *C. P. Whiteley*: 7, 9, and 11, Britannia-st., King's Cross, u.t. 17 yrs., g.r. 11*l.* 10s., 380*l.*; i.g.r. of 29*l.* 16s., u.t. 15 yrs., with reversion for 2 yrs., Marylebone, 360*l.*—By *Hobson, Richards, & Co.*: No. 40, Tulse Hill, u.t. 26 yrs., g.r. 12*l.*, 150*l.*—By *D. Young*: 139 and 143, Hungerford-rd., Camden-rd., u.t. 68 yrs., g.r. 4*l.*, r. 78*l.*, 835*l.*; i.g.r. of 16*l.* 16s., u.t. 68 yrs., g.r. 6*l.*, 205*l.*; "The Hungerford Arms," u.t. 68 yrs., i.g.r. 50*l.*, g.r. 1*l.* 15s. 6d., 1,000*l.*; 147, Hungerford-rd., u.t. 68 yrs., g.r. 16s., r. 45*l.*, 490*l.*; i.g.r. of 12*l.*, u.t. 68 yrs., g.r., 1*l.* 12s., 190*l.*; 48, Hungerford-rd., u.t. 70 yrs., g.r. 6*l.*, r. 60*l.*, 500*l.*; 50, 52, 58 to 68 (even), Hungerford-rd., u.t. 70 yrs., g.r. 5*l.*, 3,685*l.*; 70, 74 and 76, Hungerford-rd., u.t. 70 yrs., g.r. 18*l.*, r. 126*l.*, 1,095*l.*; 18, 20 and 25, Hildrop-cres., u.t. 56 yrs., g.r. 24*l.*, r. 165*l.*, 1,490*l.*; 36 and 41, Hildrop-cres., u.t. 56 yrs., g.r. 13*l.* 10s., r. 105*l.*, 930*l.*

MARCH 24.—By *Messrs. Trollope*: 32, James-st., Buckingham-gate, f., 6,000*l.*—By *Messrs. Chadwick*: "The Ship," Romney-st., Westminster, f., r. 50*l.*, 990*l.*; 27, Romney-st., f., r. 30*l.*, 565*l.*; "The Rose and Shamrock," Marsham-st., f., r. 40*l.*, 800*l.*; 215, High-st., Brentford, f., r. 40*l.*, 1,000*l.* By *Farebrother, Ellis, & Co.*: 8, Buckland-cres., Hampstead, u.t. 60 yrs., g.r. 20*l.*, 1,210*l.*—By *C. C. & T. Moore*: 11, Gold-st., Stepney, u.t. 32 yrs., g.r. 2*l.* 17s. 6d., 180*l.*; 13, Cleveland-st., Mile-end, u.t. 278 yrs., g.r. 10s., 345*l.*; 5 to 13 (odd), Burgess-street, Limehouse, u.t. 83 yrs., g.r. 20*l.*, 830*l.*; 40, 42 44, and 46, Ettrick-st., Bromley-by-Bow, u.t. 81 yrs., g.r. 17*l.*, 660*l.*; 49 and 51, Waterford-rd., Fulham, u.t. 65 yrs., g.r. 6*l.* 6s., 405*l.*—By *A. J. F. Gibbon*: 25, Victoria-av., Upton-pk., u.t. 94 yrs., g.r. 4*l.* 10s., r. 30*l.*, 235*l.*—By *Stimson & Sons*: 57, 59, and 61, Clifton-cres., Peckham, f., r. 72*l.*, 825*l.*; 58 to 64 even, Penrose-st., Walworth, u.t. 75 yrs., g.r. 32*l.*, r. 211*l.*, 1,675*l.*; eight sets of stabling, Penrose-mews, u.t. 75 yrs., g.r. 22*l.*, 1,320*l.*; 5 to 8, Orchard-row, Camberwell, u.t. 95 yrs., g.r. 24*l.*, 1,250*l.*; 69, College-pl., Camden-town, u.t. 79 yrs., g.r. 9*l.*, r. 81*l.* 18s., 600*l.*; 65, Dulwich-rd, Herne-hill, u.t. 73 yrs., g.r. 6*l.*, r. 38*l.*, 310*l.*; 67, Dulwich-rd., u.t. 52 yrs., g.r. 7*l.* 10s., r. 65*l.*, 560*l.*; 43, Shakespeare-rd., u.t. 72 yrs., g.r. 7*l.*, r. 36*l.*, 285*l.*; 52, Spencer-rd., u.t. 86 yrs., g.r. 7*l.*; 395*l.*; 46 to 52 (even), Effra-parade, Brixton, u.t. 69 yrs., g.r. 12*l.*, r. 124*l.* 16*l.*, 1,015*l.*; 95 and 97, Railton-rd., u.t. 76 yrs., g.r. 10*l.* 10s., r. 78*l.*, 560*l.*—By *Wilkinson, Son, & Welch* (at Brighton): 30, Guildford-st., Brighton, f., 380*l.*; 18 and 21, Waterloo-st., Hove, f., r. 120*l.*, 1,630*l.*

MARCH 25.—By *Fuller, Horsey, Sons, & Cassell*: "Albion Wharf," Holland-st., Blackfriars, area 19,000 ft., c., 18,500*l.*; 28, 29, and 30, Lambeth-sq., Lambeth, u.t. 7 yrs., g.r. 25*l.* 4s., r. 88*l.*, 210*l.*—By *Geo. Gouldsmith, Son, & Co.*: 20, Rutland-gate, Hyde-pk., u.t. 42 yrs., g.r., 12*l.* 12s., 4,250*l.*; 1, Rutland-mews, u.t. 42 yrs., no g.r., 360*l.*; f.g.r. 44*l.* 2s., with reversion in 37 yrs., Montpelier-row, Knightsbridge, 1,150*l.*; 26, Montpelier-sq., f., r. 135*l.*, 2,540*l.*—By *A. & A. Field*: a plot of freehold land, George-lane, Woodford, 150*l.*; 13, Parmiter-st., Bethnal-green, u.t. 37 yrs., g.r. 2*l.* 10s., 225*l.*—By *Baker & Sons*: f.g.r. of 143*l.*, with reversion in 85 yrs., Silwood-st., Rotherhithe (16 lots), 3,860*l.*; f.g.r. of 18*l.*, with reversion in 85 yrs., Brackton-rd. (8 lots), 889*l.*; f.g.r. of 51*l.*, with reversion in 85 yrs., Eugenia-rd. (8 lots), 1,451*l.*

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G.	ton	9/0/0 0/0/0
Teak, E.I...	load	10/10/0 15/0/0
Sequoia, U.S.ft.cu.		2/3 3/0
Ash, Canada load		2/10/0 4/0/0
Birch, do.		3/5/0 4/10/0
Elm, do.		3/10/0 4/15/0
Fir, Dantsic, &c.		2/0/0 3/10/0
Oak, do.		3/0/0 5/5/0
Canada.....		5/10/0 7/0/0
Pine, Canada red		2/10/0 3/10/0
Do, yellow		2/10/0 5/0/0
Lath, D'ntsic, fath		5/0/0 6/0/0
St. Petersburg		5/0/0 7/0/0
Deals, Finland, 2nd & 1st std	100	8/10/0 10/10/0
Do, 4th & 3rd..		7/10/0 8/10/0
Do. Riga		6/10/0 8/0/0
St. Petersburg, 1st yellow ..		11/0/0 15/0/0
Do. 2nd yellow		8/10/0 10/0/0
Do. white		7/10/0 10/10/0
Swedish		7/15/0 16/0/0
White Sea		8/10/0 18/0/0
Canada, Pine 1st		20/0/0 26/0/0
Do. do. 2nd....		14/10/0 16/0/0
Do. do. 3rd, &c.		8/0/0 10/5/0
Do. Spruce. 1st		8/10/0 11/0/0
Do. do. 3rd & 2nd.....		6/15/0 8/0/0
New Brunswick		7/0/0 7/10/0
Battens, all kinds		3/10/0 15/10/0
Flooring Boards, sq., 1 in. prep.		
1st		0/8/6 0/14/6
Do. 2nd.....		0/7/6 0/11/6
Other qualities		0/4/6 0/8/0
Cedar, Cuba ..ft.		3½ 4½
Honduras, &c.		2½ 4
Mahogany, Cuba.		4½ 6½
St. Domingo, cargo av		4½ 2'0
Mexican do. do		4 5
Tobasco do. do		5½ 7
Honduras do..		5½ 6½
Box, Turkey ton		4/0/0 15/0/0
Rose, Rio.....		10/0/0 20/0/0
Bahia		9/0/0 18/0/0
Satin, St. Domingo ..ft.		0/0 8 0/1/3

TIMBER (*continued*).		
Satin, Porto Rico	0/0/8	0/1/6
Walnut, Italian..	0/0/3½	0/0/7
METALS.		
IRON—Pig, in Scotland .....ton	2/0/9	2/1/0
Bar, Welsh, in London.....	6/0/0	8/10/0
Do. do. at works in Wales	5/10/0	6/0/0
Do. Staffordshire, in London	6/5/0	6/15/0
COPPER—British, cake and ingot	49/0/0	50/0/0
Best selected ..	50/0/0	50 10/0
Sheets, strong..	59/0/0	60/0/0
Chili, bars	45/8 9	45/16/3
YELLOW METAL lb.	0/0/5½	0/0/5¾
LEAD—Pig, Spanish....ton	10/17/6	10/18/9
English, com. brands	11 0 0	11/5/0
Sheet, English, 8 lbs. per sq. ft. and upwards ..	13/0/0	0/0/0
Pipe	13/10.0	0/0/0
ZINC—English sheet .....ton	25/5/0	0/0/0
Vieille Montagne.....	25/15 0	0/0/0
TIN—Straits	89 12/6	90/2/6
Australian	89/17/6	90 7/6
English Ingots	93/0/0	93 10/0
OILS.		
Linseed .....ton	18/15/0	19/0/0
Cocoanut, Cochin	24/15/0	0/0/0
Do. Ceylon	22/15/0	0 0 0
Palm, Lagos	23/0/0	0/0/0
Rapeseed, English pale	25/10/0	26/0/0
Do. brown	23/10/0	23 15.0
Cottonseed ref...	18/15/0	19/0/0
Oleine	21/10/0	22/10/0
Lubricating, U.S.	4/0/0	5/0/0
Do. refined	5/0 0	10/0/0
TAR—Stockholm barrel	0/19/0	1/0/0
Archangel	0/12/6	0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 12 *noon on Thursdays.*]

BARNET.—For building a villa residence at Barnet, for Mr. Chipperfield. Mr. Joseph White, architect, High-street, Barnet:—

Brown	£1,498	Wilmot & Sons	£1,295
Elwood	1,330	Houghton & Son	1,262
Daniels	1,297	Butcher	1,130

BEDDGELERT (Wales).—Accepted for additions to chalet, for Sir Edward Watkin, Bart., M.P. Messrs. Thomas Roberts & Son, architects, Portmadoc:—

William Jones, Portmadoc £155 10 0

BLYTH (Northumberland).—For alterations and extensions to Central Hall, for Mr. John Robinson. Mr. Gibson Kyle, architect, 130, Pilgrim-street, Newcastle-on-Tyne. Quantities by Mr. Alfred G. Kyle:—

Brown	£1,650 16 1	J. Richardson & Co.,	
Lilburn	1,494 10 0	Newcastle*	£1,408 12 0
J. C. Hope.....	1,420 10 8	* Accepted.	

BRISTOL.—For sewerage works at Brislington, Keynsham, for the Rural Sanitary Authority. Mr. F. Fox, engineer. Quantities by Messrs. A. P. I. Cotterell & A. Barratt:—

S. Ambrose	£4,285	C. Gardiner	£3,395
T. J. Davis	3,706	C. A. Hayes	3,367
W. Mereweather.....	3,597	Love & Waite, Bristol* ..	3,187
Cowlin & Son	3 573	R. R. Facey	2,898
Stephens & Bastow.....	3,399	* Accepted.	

BROMLEY (Kent).—For making-up Waldo-road, for the Bromley Local Board. Mr. Hugh S. Cregreen, surveyor:—

S. Hudson.....	£410 8 0	J. Lansbury.....	£355 4 5
Woodham & Fry	395 0 2	R. Fell & Sons	347 6 5
Mayo & Co.	372 0 0	J. Mowlem & Co.*	327 0 0
		* Accepted.	

CARNYORTH (Cornwall).—For the erection of a school to accommodate 200 children at Carnyorth, in the Parish of St. Just-in-Penwith, for the St. Just-in-Penwith School Board. Mr. Oliver Caldwell, architect, Penzance:—

Ford & James	£2,522 0 0		
Marks & Roberts, St. Just, Penzance (accepted)..	1,899 16 0		
Carpenter, Joiner, Plumber, Smith, Painter, and Glazier only.			
James Roberts	£641 15	Joseph James.....	£536 0
J. Gibson.....	£98 10		

HARROGATE.—Accepted for the erection of Wesleyan schools, Grove-road, Harrogate. Messrs. Morley & Woodhouse, architects, 269, Swan-arcade, Bradford, Yorks. Quantities by the architects:—

Mason's Work.—Jas. Simpson, Harrogate.....	£697 0 0
Joiner's Work.—Checkley, Harrogate	360 0 0
Plumber's, Glazier's, and Gas Work.—J. Lindley, Leeds.....	117 0 0
Plasterer.—Lancock, Harrogate	39 0 0
Painter.—Dent, Harrogate	26 0 0
Shepherd, Harrogate	50 0 0
Total	1,289 0 0

LIVERPOOL.—For alterations to Turkish baths at 18, Leigh-street, Church-street, Liverpool, for Mr. Robert Parry. Mr. J. W. Auger, architect, 3, North-view, Edge-hill, Liverpool:—

Raffle & Campbell	£520 0	J. & J. Crosbie	£477 0
F. Mayor & Co.	499 0	W. Hall	398 8
W. Sinnott.....	494 5	W. Hunt	340 0
[All of Liverpool.]			

LONDON.—For alterations and decorations to 47, Cromwell Houses, S.W., for Mrs. Morrison. Messrs. Florence & Satchell, architects:—

Marler & Bennett.....	£2,131 1 6

LONDON.—For alterations and repairs (exclusive of fittings), to No. 10, John-street, W.C., for adaptation as a Public Library, for the Holborn District, for the Commissioners. Messrs. Fletcher & Migotti, architects:—

Patman & Fotheringham....	£483	Wells & Son	£375
Sobey	419	King (accepted)	278

LONDON.—For alterations, &c., at "The King's Head" public house, Ebury Bridge, Pimlico, S.W., for Mr. C. Brown. Messrs. Fletcher & Migotti, architects:—

Walker Bros.	£477	Courtney & Fairbairn, Camberwell*	£379
Best..	430		
Jackson & Jennings	429	* Accepted.	

LONDON.—Accepted for building workshops, St. Paul's-road, Camden-road, for Mr. George Cording. Mr. John Young, architect, 3, Great Winchester-street, E.C.:—

Percival Hart, Station Works, West Green £557 0 0
[No competition.]

LONDON.—For alterations, &c., at the Southwark Gas-meter Testing Station, for the London County Council. Mr. Thomas Blashill, Architect:—

William Downs	£580	W. Oldrey & Co.....	£496
Co-operative Builders Ltd...	570	G. H. & A. Bywaters.....	495
Higgs & Hill.....	540		

LONDON.—Accepted for alterations and painting at Huntingdon House, Hornsey-lane, for Mr. S. W. Francis. Mr. W. Graves, architect, Winchester House, Broad-street, E.C.:—

E. Houghton & Son, Stroud-green £173 0 0

LUTON.—For the erection of factory, King-street, for Messrs. Garrard & Staddon. Mr. A. E. Smith, architect, Luton:—

Pryer.....	£1,598 0	Saunders.....	£1,455 12
Neville	1,490 0	Dunham	1,394 0
Smart	1,445 10		
[All of Luton.]			

LUTON.—For the erection of two houses, Cromwell-road, for Mr. W. Cherry. Mr. A. E. Smith, architect, Luton:—

Parkins	£645 0 0	Smart	£495 0 0
Kingham	517 0 0	Wright	477 0 0
Saunders	507 10 6	Pryer	474 10 0

NEATH.—Accepted for the execution of the Maesyrhaf and Melincythan Improvements, for the Urban Sanitary Authority. Mr. D. M. Jenkins, A.M.I.C.E., Borough Surveyor, Gwyn-hall, Neath. Quantities by the Borough Surveyor:—

D. Dodd, Neath..... £425 0 0

NEWBURY (Berks).—For alterations and additions to Arlington Manor, for the Hon. Sir Francis Jeune. Mr. James H. Money, architect, Newbury. Quantities by Messrs. R. L. Curtis & Sons:—

A. Estcourt	£1 759 0 0	G. Elms	£1,393 0 5
J. Shillitoe & Sons..	1,620 0 0	E. James & Son	1,287 10 0
T. H. Kingerlie	1,604 0 0	A. H. Houghton, Newbury*	1,178 0 0
G. Allen.....	1,510 0 0		
T. Halliday	1,437 0 0	* Accepted.	

NEWPORT (Mon.).—For an extension of the "Cross Keys" Hotel, Newport, Monmouthshire, including dining-hall, &c., for Mr. S. G. Hobbs. Mr. W. Conyers Kirby, architect, Gloucester Bank Chambers, Newport. Quantities by the architect:—

J. Hooper	£1,220	Jno. Jenkins.....	£1,137
J. Linton	1,180	G. F. Sharrem	1,089
J. T. Morris	1,150	D. Parfitt	1,064
Wm. Price.....	1,145	Geo. Wilkins	1,051
[All of Newport.]			

NEWPORT (Mon.).—For erecting new business premises, Skinner-street, for Mr. Ingleton. Messrs. Habershon & Fawckner, architects:—

T. Webb	£2,557 0	Morgan & Roberts	£2,305 0
Moulton & Brownscombe	2,500 0	J. Linton	2,216 10
C. Lock	2,425 0	E. Richards	2,216 0
Westacott	2 403 0	Blackburn	2,167 0
T. G. Diamond	2,395 0	G. Wilkins	2,150 0
W. A. Linton	2,349 0	W. Moore	2,138 0
		[All of Newport.]	

NEWPORT (Mon.).—For rebuilding the "Blucher's Arms," Griffin-street, for Mrs. George Jones. Messrs. Habershon & Fawckner, architects:—

G. Wilkins	£1,100 0	T. Webb	£1,035 0
Westacott	1,084 15	W. Price	1,032 0
J. Linton	1,080 0	E. Richards	1,030 0
Williams, Rees, & Son	1,070 0	W. A. Linton.....	1 025 0
W. Moore	1,050 0	Blackburn	1,025 0
Moulton & Brownscombe	1,050 0	Morgan & Roberts	990 0
		[All of Newport.]	

NEWPORT (Mon.).—For rebuilding 114, Commercial-street, Newport, for Mrs. Rowe. Messrs. Habershon & Fawckner, architects:—

W. Moore	£742	Westacott.....	£635
T. G. Diamond	735	Blackburn	633
G. Wilkins	700	W. A. Linton	632
W. Price	698	Williams, Rees	630
T. Webb	695	Morgan & Roberts.....	625
J. Linton	690	E. Richards	616
		[All of Newport.]	

NORTHALLERTON.—For the widening of the county bridge, Upleatham, for the North Riding (Yorks) County Council. Mr. Walker Stead, C.E., County Surveyor, Court House, Northallerton :—

Parker & Sharp	£442 12 0	W. C. Atkinson	£231 1 0
Isaac Atkinson	276 17 0	Wm. Blackburn, Leven Bridge, Yarm *	226 19 6
White & Cruddas	243 4 6		

[Engineer's estimate, £240.]
* Accepted.

OSWESTRY.—For the erection of the Oswestry Municipal Buildings. Mr. T. M. Lockwood, architect, Chester :—

Jackson Bros.	£9 920	J. Matthews	£8,728
J. D. Williams	9,700	W. E. Samuels	8,690
Stephens & Bastowe	9,699	T. Martin	8,625
Davies Bros	9,200	W. H. Thomas, Oswestry*	8,597
Gethin	8,888	R. Price	8,395
Kelly Bros.	8,780	J. S. Kimberley	8,251

* Accepted.

PENZANCE.—For the erection of a convalescent home, near Alexandra-terrace, Penzance, for Mr. T. B. Bolitho, M.P. Mr. Oliver Caldwell, architect, Victoria-square, Penzance :—

Reed, Blight, & Co.	£3,835 0 0	Wm. Trounsor	£3,141 2 11
Perkins, Caldwell, & Caldwell	3,208 0 0	Richard Walters	3,029 15 0
Richard Hill	3,149 0 0	Arthur Carkeek, Redruth*	2,674 0 0
Joseph James	3,145 15 0		

* Accepted.

RUGBY.—For the construction of a circular gasholder tank and other works thereto. Mr. J. Simpson, engineer :—
B. Cooke & Co., Battersea (accepted) £2,600 0 0

STRATFORD.—For alterations and dilapidations at the "Marsh Gate" Tavern, High-street, Stratford, E., for Mr. A. E. Carter. Mr. Fred A. Asston, architect, 3, Crooked-lane, E.C. :—

Hearle & Farrow	£442	F. Yolter	£372
W. Shurmur	429	W. Watson (accepted)	348
North Bros.	415	Coulsell Bros.	347

SUNDERLAND.—For the erection of a miners' hall, retiring, and reading-rooms, &c., at Silksworth, for the Miners' Association. Mr. Henry Grieves, architect, Albany-chambers, South Shields. Quantities by Messrs. Boreham & Morton, Sunderland :—

Draper & Sons	£3,640 10 3	M. B. Cooper	£3,060 9 6
Robert Alison	3 339 8 8	J. Elrick	3,011 17 10
George Moir	3,249 4 0	T. P. Shaftoe, Sunderland*	2,945 0 0
C. D. Potter	3,236 0 0		
D. Rankin	3,203 0 0		

* Accepted.

THORPE SATCHVILLE (Leicestershire).—For repairs and alterations at farm buildings, Thorpe Satchville. Messrs. Miles & Beasley, architects, 37, Friar-lane, Leicester :—

Peodleton & Bambury	£160 0	C. Broughton, Hungarton, Leicester*	£93 15
E. Clarke	104 0		

* Accepted.

WIMBLEDON.—For the construction of roads and sewers on the Wimbledon Park Estate. Mr. William Hunt, surveyor, 5, York-buildings, Adelphi, W.C.—

Contract No. 1.		*Contract No. 2.*	
Adams	£3,789	Adams	£2,189
Tomes & Wimpey	3,470	Nowel & Robson	2,180
Nowel & Robson	3,460	E. Rogers & Co.	2,100
E. Rogers & Co.	3,430	Joseph Mears	2,060
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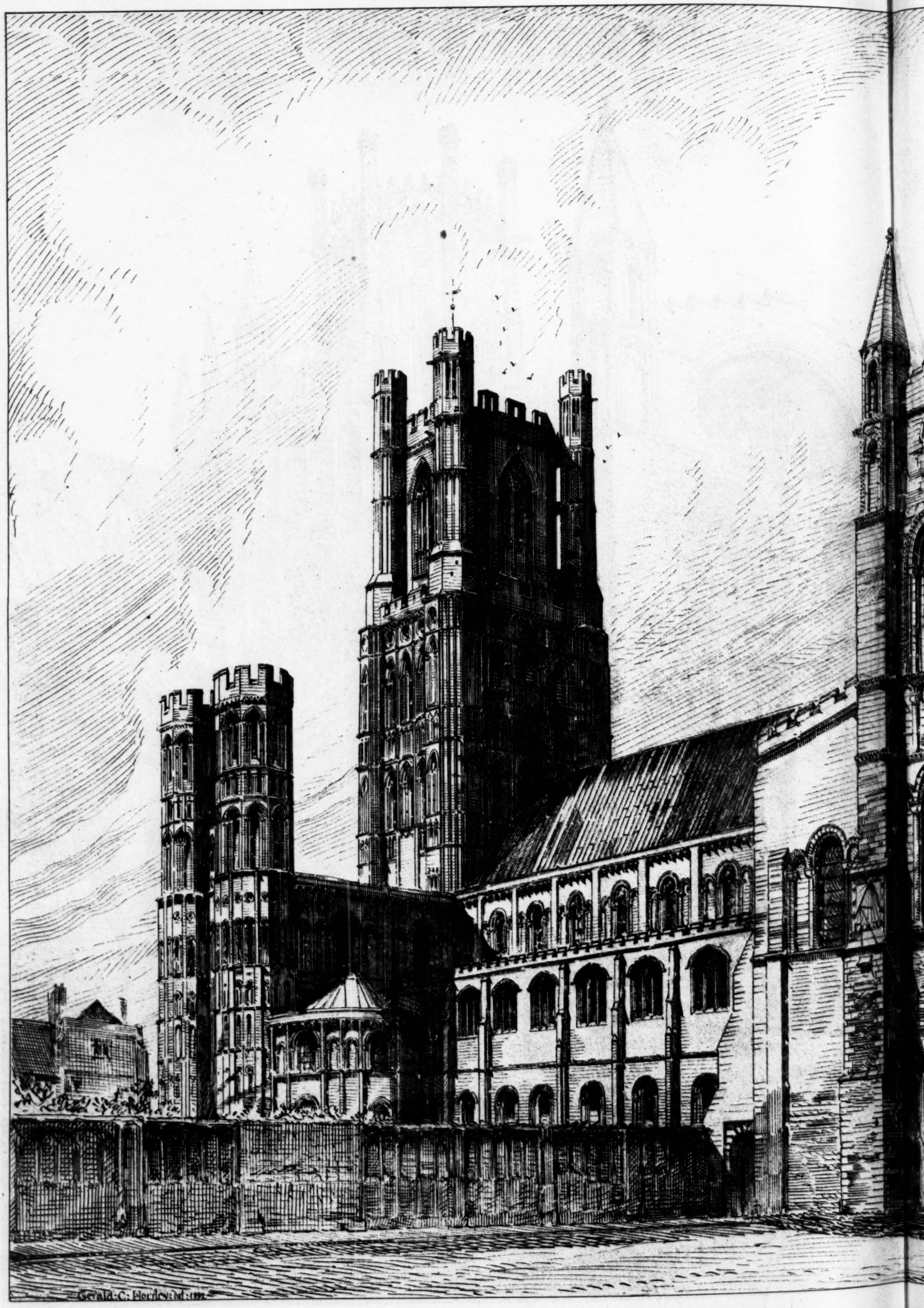

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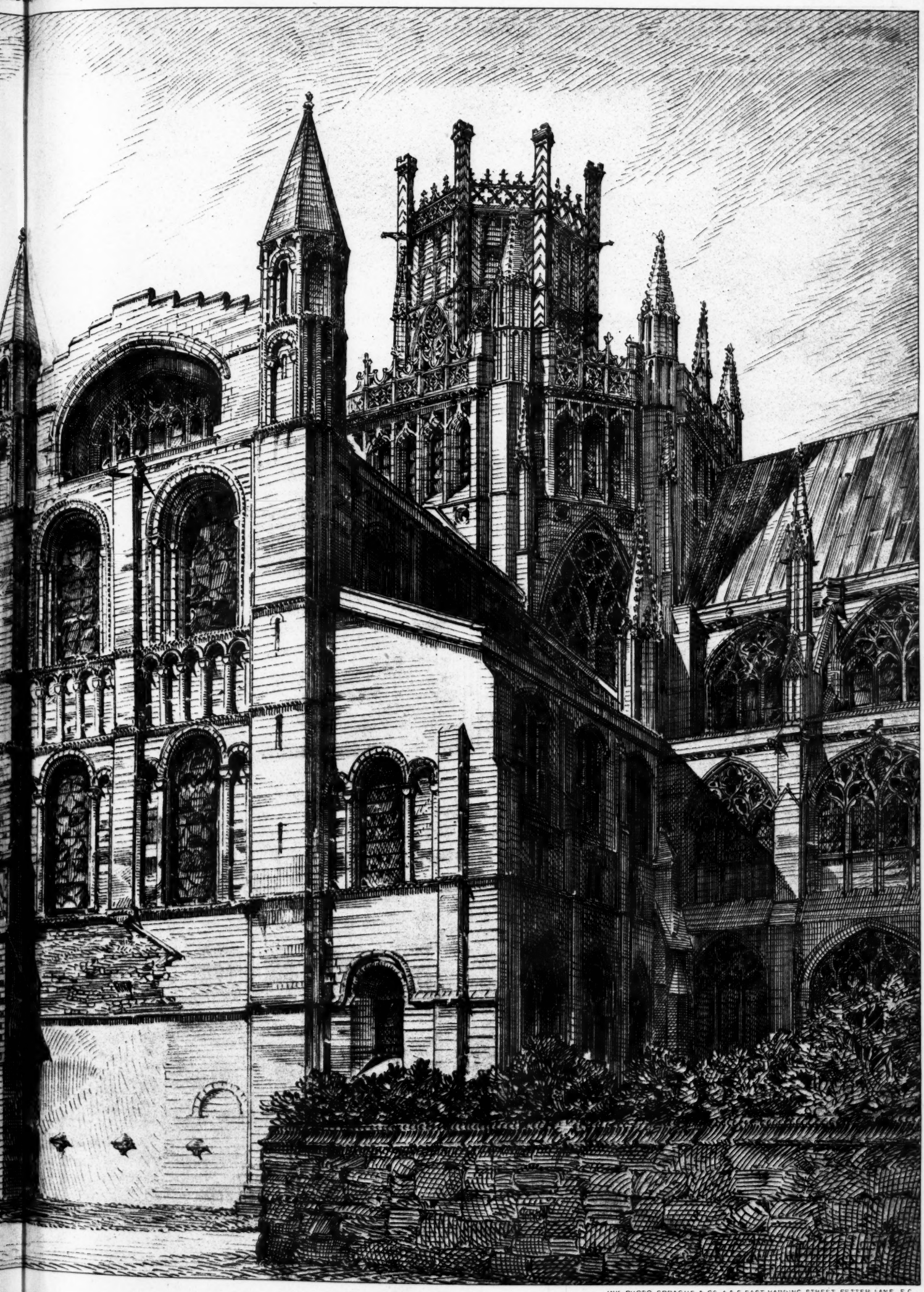

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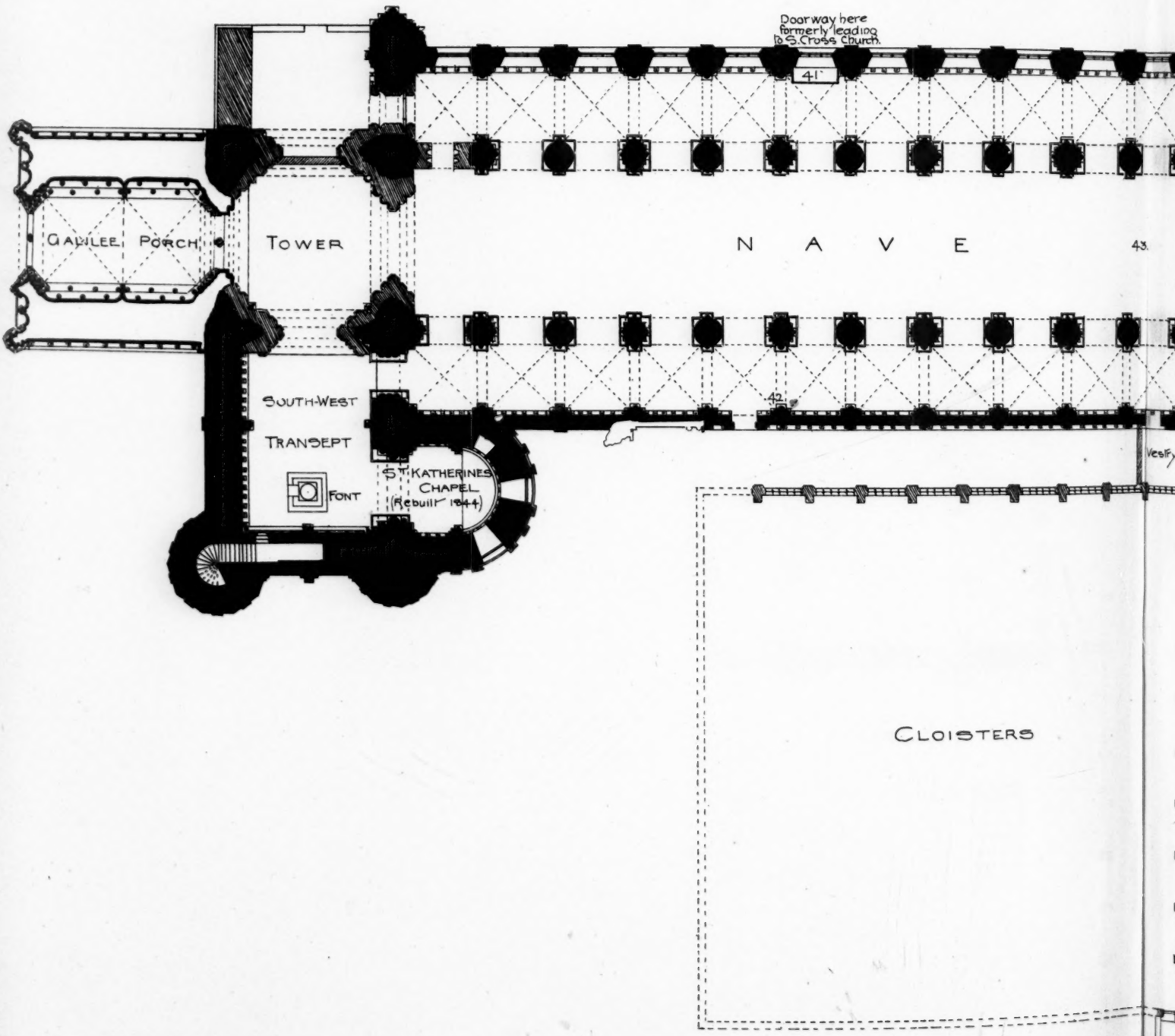
England and Wales.

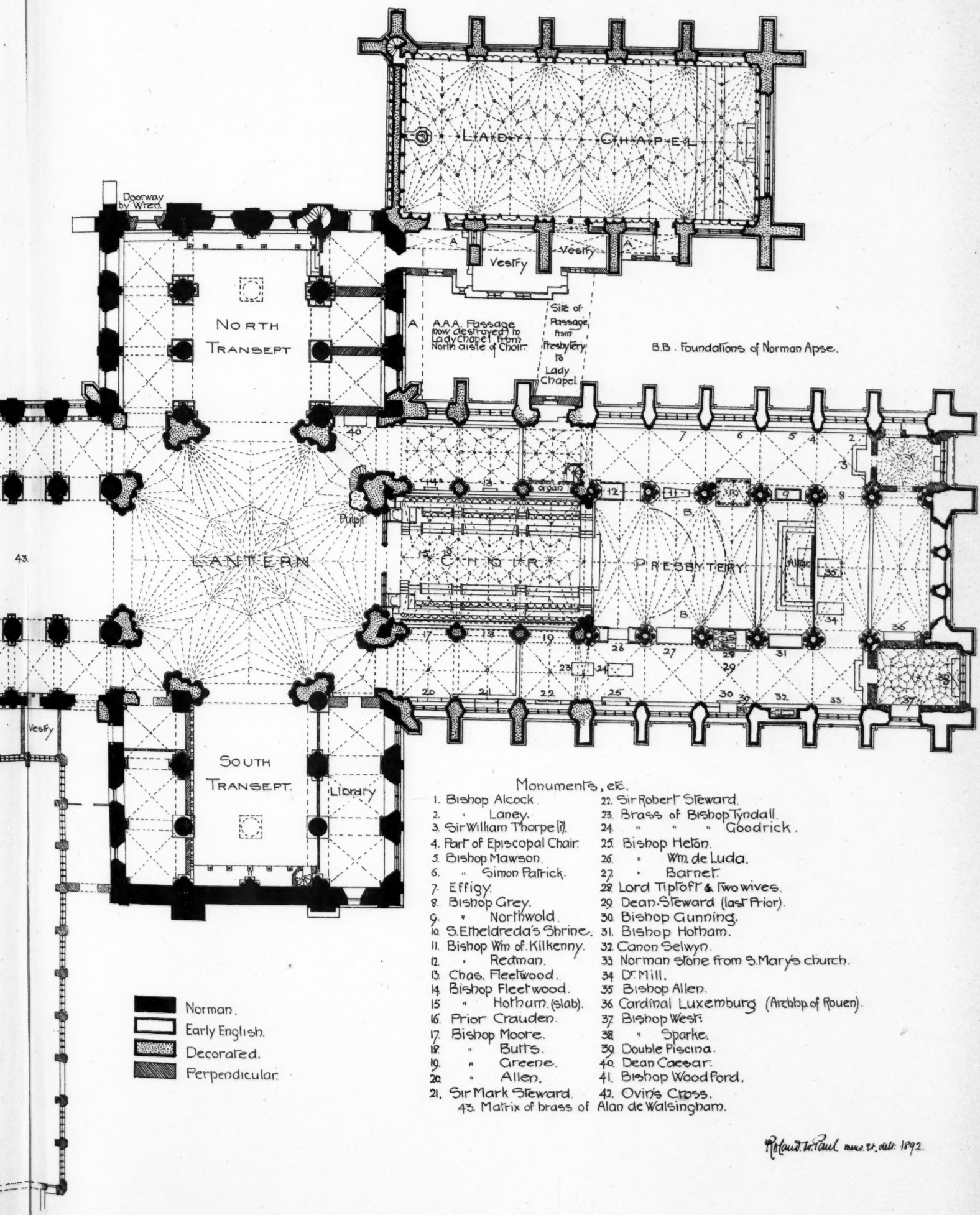
VN BY MR. GERALD C. HORSLEY.

ELY CATHEDRAL

GROVND PLAN.

10 5 0 10 20 30 40 50 100 Feet.
Scale.



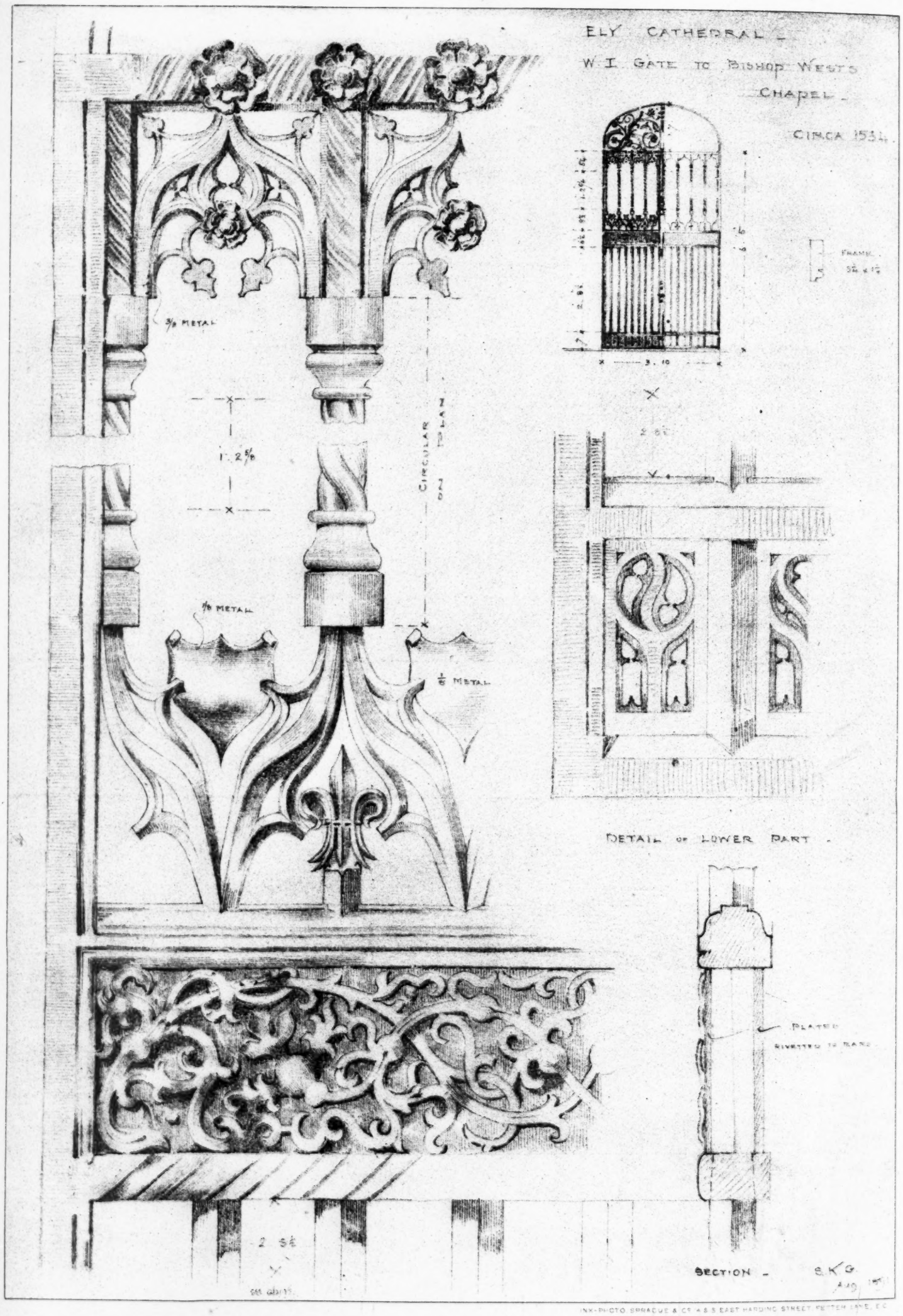


Monuments, etc.

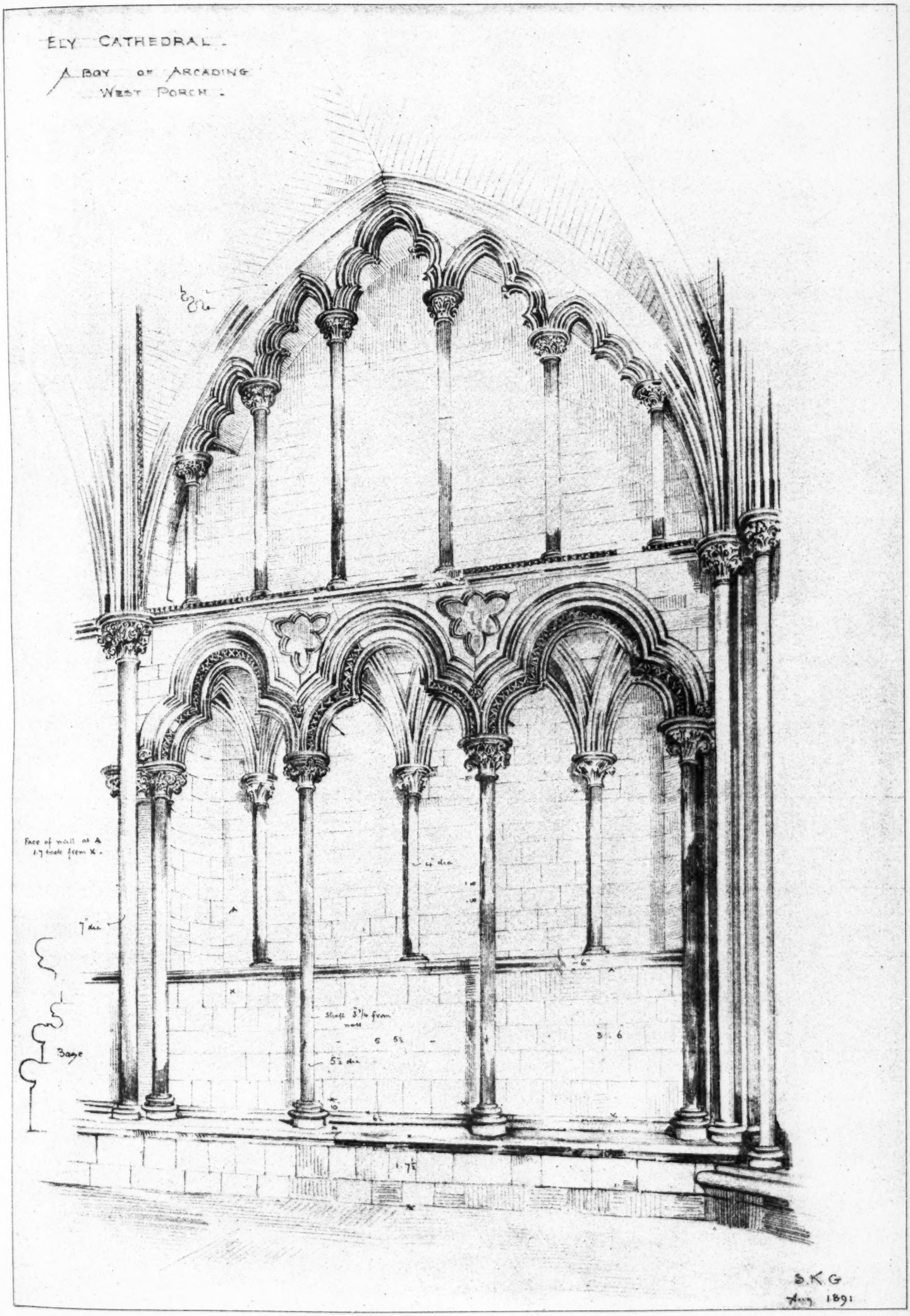
1. Bishop Alcock.
2. " Laney.
3. Sir William Thorpe (?).
4. Part of Episcopal Chair.
5. Bishop Mawson.
6. " Simon Patrick.
7. Effigy.
8. Bishop Grey.
9. " Northwold.
10. S. Etheldreda's Shrine.
11. Bishop Wm of Kilkenny.
12. " Redman.
13. Chas. Fleetwood.
14. Bishop Fleetwood.
15. " Hotham. (slab).
16. Prior Crauden.
17. Bishop Moore.
18. " Butts.
19. " Greene.
20. " Allen.
21. Sir Mark Steward.
22. Sir Robert Steward.
23. Brass of Bishop Tyndall.
24. " " " Goodrick.
25. Bishop Heton.
26. " Wm. de Luda.
27. " Barnet.
28. Lord Tiptoft & Two wives.
29. Dean Steward (last Prior).
30. Bishop Gunning.
31. Bishop Hotham.
32. Canon Selwyn.
33. Norman stone from S. Mary's church.
34. Dr. Mill.
35. Bishop Allen.
36. Cardinal Luxemburg (Archbp. of Rouen).
37. Bishop West.
38. " Sparke.
39. Double Piscina.
40. Dean Caesar.
41. Bishop Woodford.
42. Ovin's Cross.
43. Matrix of brass of Alan de Walsingham.

Roland Paul mens. et. delt. 1892.

PHOTO-LITHO. SPRAGUE & Co 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.



DRAWN BY MR. S. K. GREENSLADE.



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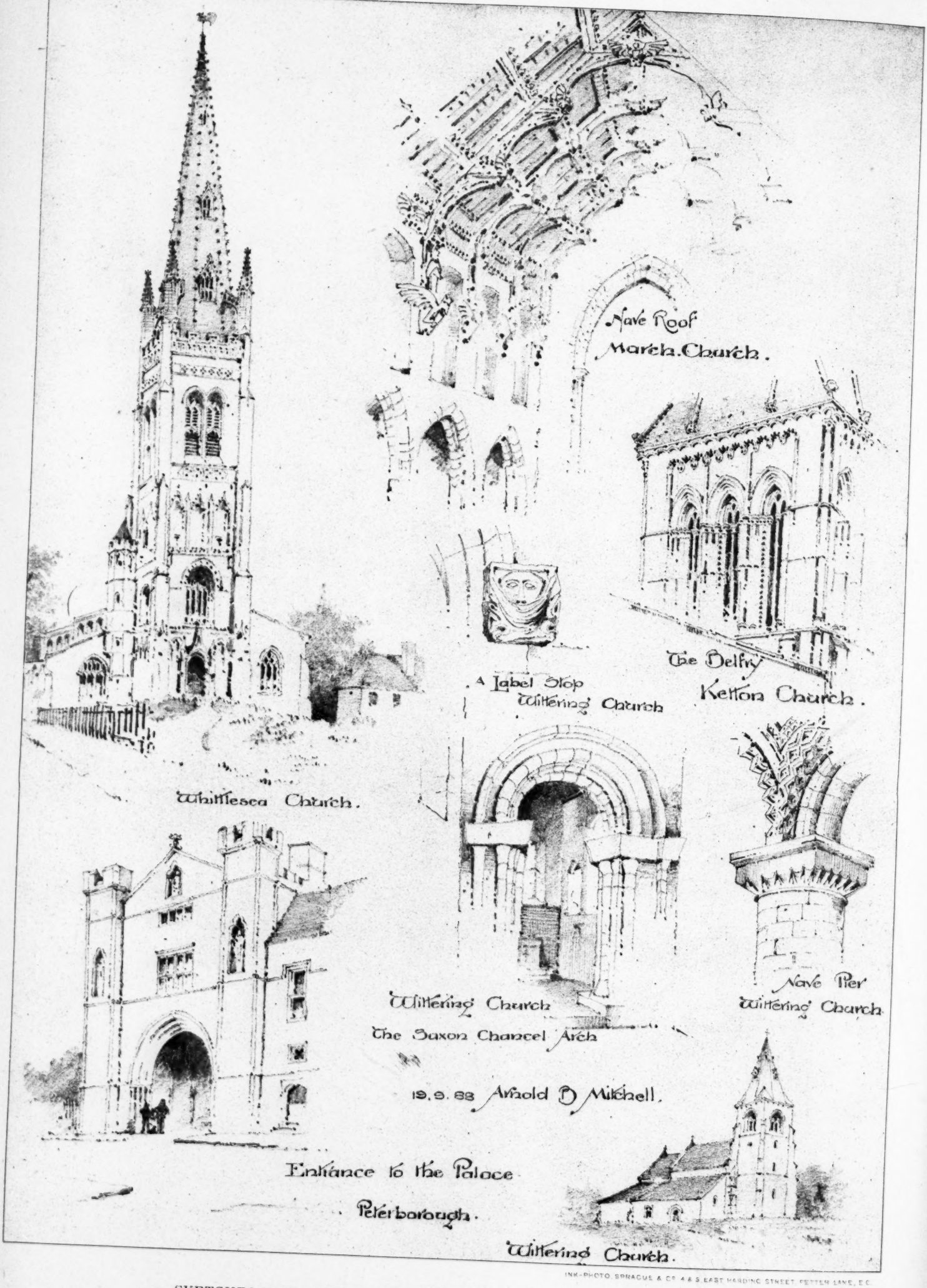

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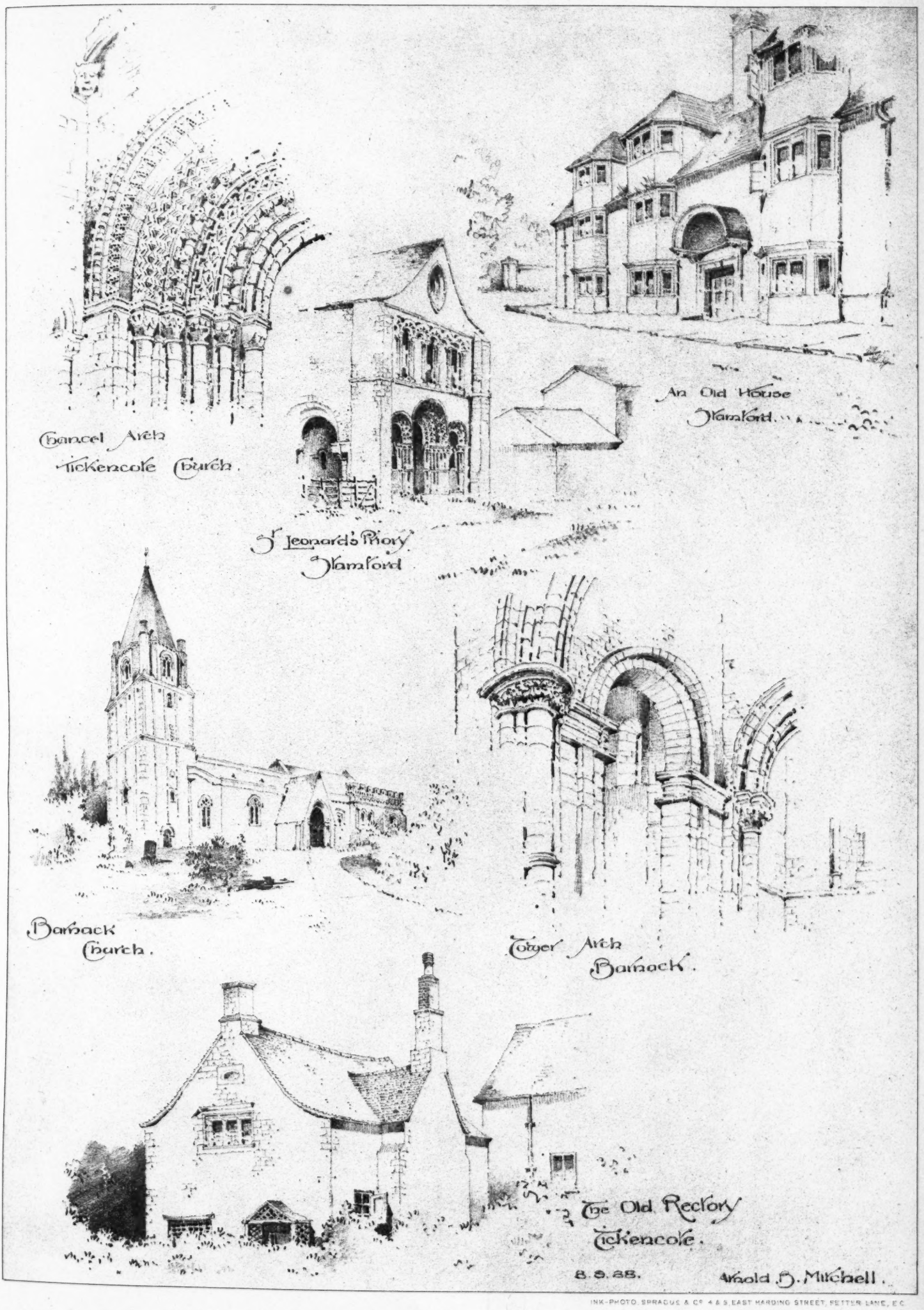
SKETCHES NEAR PETERBOROUGH.—By Mr. Arnold Mitchell, A.R.I.B.A.



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